

THE IRON AGE

New York, May 16, 1918



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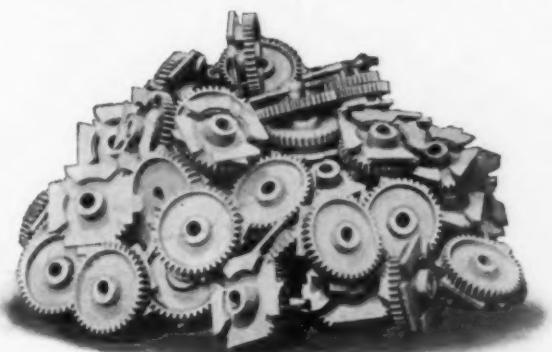


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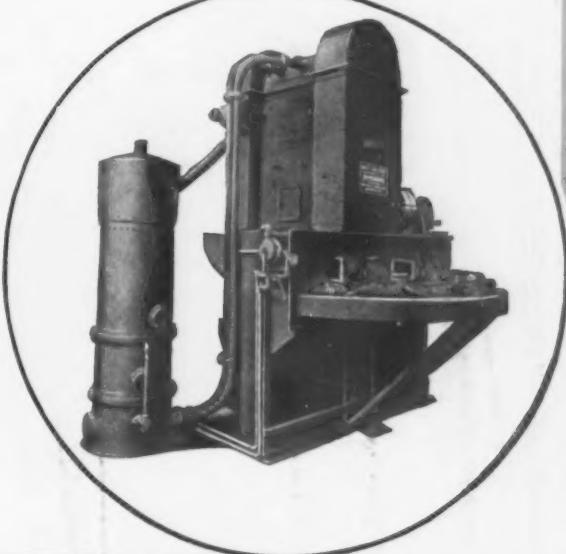


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KOPPERS OVENS

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H. KOPPERS COMPANY

Builders of the Koppers Oven
PITTSBURGH, PA.

THE IRON AGE

New York, May 16, 1918

ESTABLISHED 1855

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Japanese Development in Steel-Making

Dependence on Asiatic Mainland Ores—
The Hanyang Plant in China—Japan's Re-
sources, Steel Consumption and Prospects

BY THOMAS T. READ

THE description of the iron blast-furnace plant at Pen-hsi-hu, Manchuria, presented at the February meeting of the American Institute of Mining Engineers by C. F. Wang, one of my former students, and abstracted in THE IRON AGE, Feb. 7, 1918, serves to indicate how the Japanese iron industry, having taken root on the Asiatic mainland, is beginning to flourish there. The present progress and future possibilities of that industry are of no little interest.

The Earliest Iron Makers

There has been, from remote times, a steel industry in Japan, as sword collectors are well aware. This seems to date from the seventh century, though but little is known about its beginnings. The ore used was magnetite sand, which occurs in many valleys and along the seacoast of the islands, especially in Chugoku and Rikuchu. Toward the end of the Tokugawa dynasty the manufacture of guns and cannon caused increased interest in the iron industry and the feudal lords established iron works at several places.

When the "era of enlightenment" (Meiji) began in 1868, and modern industry commenced to develop, there was a need for iron products on a scale that these artisans, who turned out a small quantity of high-grade products at the expenditure of infinite labor and remarkable skill, were quite unable to attain. The earliest needs were naturally supplied by the importation of fabricated machinery but the leaders of the nation have, from the beginning of the modern era, shown a remarkably clear understanding of industrial statesmanship. The industrial development of

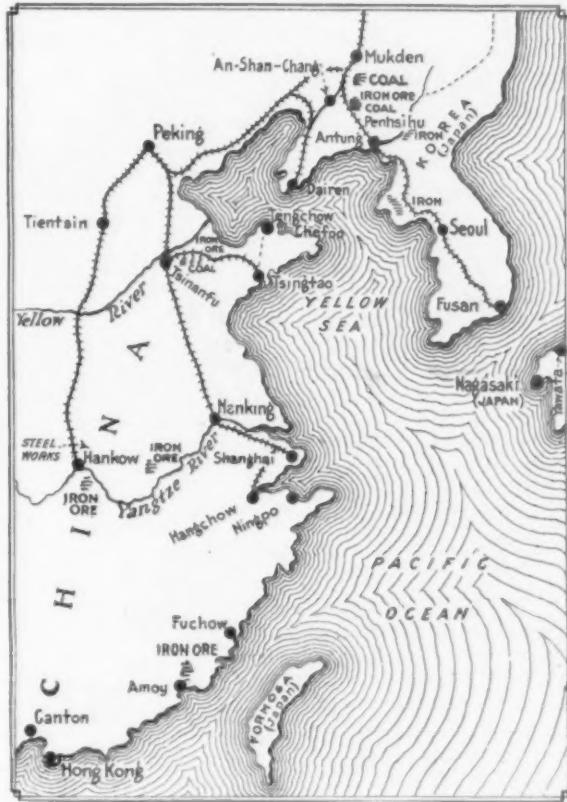
Germany was studied and a similar result was aimed at.

One of the first considerations, of course, was the development of an iron and steel industry from the raw ore to the finished product. A government-owned iron works was started at Yawata, not far from Moji, a small port at the western end of the Inland Sea, which is familiar to every traveler in the Orient as the place at which the trans-Pacific steamers take on coal. This began operations in 1899 as a steel-making and fabricating plant, using pig iron that was brought from Europe at rather low freight rates. In addition to its commercial aspect this served as a training school for native metallurgists and the intention was to develop native sources of ore supply and make pig iron as soon as practicable. In 1901 the making of pig iron from Chinese ore was started.

Meanwhile the geological exploration of Japan was progressing and the program of development received the first severe set-back. The iron ore resources of Japan proved to be discouragingly limited in amount. This subject is discussed in great detail by K. Inouye in the "Iron Ore Resources of the World," published at Stockholm in 1910,

and I will review only the main points.

Contact deposits in Paleozoic limestone at or near its contact with eruptive rocks are the most important and constitute the larger part of the ore supply. The largest of these are at Kamaishi, Sennin, Akatani, and Dorogawa. At Kamaishi the known ore amounts to 14,000,000 tons and probable ore 35,000,000 tons of magnetite. At Akatani the



The Iron Ore and Coal Deposits of China in Which the Japanese Are Largely Interested

known ore amounts to $2\frac{1}{2}$ million tons of hematite. The amount of known and probable ore at the other places is almost negligible from the American viewpoint; for example, the probable ore at Ishikawa amounts to $1\frac{1}{4}$ million tons. Inouye distinguished five other types of ore deposits, but they are little more than of geological interest. In short, the probable total ore resources of Japan do not exceed one year's production of the Lake Superior district.

Operations at Hankow

Meanwhile, in China H. H. Sheng and his colleagues were endeavoring to make a success of the iron-smelting industry that Li Hung Chang had initiated at Hankow. They had developed a body of iron ore of fairly good size and grade at Tayeh in Hunan. This is seen on the map just southeast of Hankow. Being more in need of money than they were of ore they were glad to negotiate with Japanese interests for a loan, the *quid pro quo* being a long-time contract for ore at a price favorable to the Japanese. As ocean-going steamers can approach within a dozen miles of the Tayeh deposits this enabled the Yawata plant to get a supply of Bessemer ore at a reasonable price, and for a long time it was imported at the rate of about 100,000 tons per year. By 1910 \$25,000,000 had been invested at the plant at Yawata and it was making an operating loss of \$500,000 to \$750,000 per year. According to T. Haga* the reasons for this were the comparatively high cost of fuel, the lack of skilled workmen and the dependence on foreign sources for raw material. My own diagnosis is that the second of these reasons is by far the more important, and management should be included with workmen. At that time the plant was producing about 150,000 tons per year of iron and steel, but its capacity has been increased by steady enlargement and the output in 1916 was 280,000 tons of iron and steel.

Imports of iron and steel into Japan in 1910 were 500,000 tons and in 1916 they were 787,000 tons, corresponding to 70 per cent and 60 per cent of the domestic consumption, respectively.

Plants at Kamaishi and Hokkaido

The next most important producer in Japan is the Kamaishi mine, in the prefecture of Iwati, owned by C. Tanaka, where magnetite ore of good quality occurs in limestone. This was discovered in 1823. Work was begun about 1850 and carried on irregularly until 1864 when 10 furnaces, each making 4 tons per day, were built and operated until 1868. For a while it was operated by the government but it proved a commercial failure. In 1882 Mr. Tanaka bought the mine and has since made a success of it. This ore is smelted in small blast furnaces of which there were seven in 1913, and is turned into steel in small open-hearth furnaces, of which there were four. The production in 1913 was about 50,000 tons of pig iron and 15,000 tons of steel. The output for this year is estimated at 70,000 tons. Not far away, at Sen-ninyama, a small amount of pig iron is made in charcoal blast furnaces.

In 1910 an attempt was made to develop the steel industry at Hokkaido, on the strength of the coal and magnetite sand occurring near Muroran. The Hokkaido Colliery & Steamship Co. secured the co-operation of Armstrong & Co. and Vickers

Sons & Maxim, Ltd., in the Nippon Steel Foundry. After a good deal of money had been spent it was found that the ore supply (concentrates from the sand of the shore) was utterly inadequate and that part of the plant which is now in operation makes open-hearth steel from pig iron. This plant is reported to have doubled its capital recently and is probably increasing its operations. Not far away is a subsidiary, the Wanishi Iron Works, which makes pig iron in two 50-ton blast furnaces from iron ore imported from Korea and China.

Operations in Korea and Manchuria

The Russo-Japanese war and the changes which grew out of it materially improved the iron situation for Japan. Iron smelting probably developed earlier in Korea than it did in Japan, but there are no authentic records. The known ore deposits are described by K. Inouye in the "Iron Ore Resources of the World," and their general occurrence is indicated on the accompanying map. The ore is chiefly hematite and limonite, the analyses cited in the paper mentioned range from 52 per cent to 63 per cent iron, but the sulphur is generally low and the phosphorus is sometimes above and sometimes below Bessemer grade. The deposits near Sai-nai are reported to be furnishing about 100,000 tons of ore per year to the Yawata works. The Mitsubishi Company owns deposits nearby, but I am told these have not reached the producing stage. Mitsui & Co. have been exploring Korean deposits, but nothing has been published as to the results. My own personal belief is that the iron deposits of Korea will not prove large nor persistent and will only serve as a temporary ore supply for the plants in Japan that operate on ore imported from the Asiatic mainland.

The growing interest of Japan in southern Manchuria after the Russo-Japanese war naturally leads to the starting of joint Japanese-Chinese enterprises there as soon as the Chinese aversion to any kind of co-operative work can be overcome. In southern Manchuria Okura & Co. has developed the joint Japanese-Chinese enterprise, described by Mr. Wang, at Pen-hsi-hu, which is on the Anting-Mukden railway about 70 miles southeast of Mukden. At this point there is a fair quantity of magnetite ore of good quality and large amounts that can be concentrated, not far from a field of coking coal that is estimated by S. S. Loh to contain 123,000,000 tons of coal. Here iron mining has been started and a magnetic concentration plant built, coal mining, coal-washing and coke-making is in progress and a 150-ton blast furnace (started in 1911) is in operation, while another is to be started early in 1918. This enterprise is of special moment, since it is the first case I know of of the successful and harmonious development of a joint Japanese and Chinese enterprise.

An even more important deposit than Pen-hsi-hu has been developed in southern Manchuria at An-Shan-Chang. Reports as to ore reserves must always be regarded with caution unless based on careful observations, but apparently this is the largest iron ore deposit yet discovered in China. I have been told that it contains more than 100,000,000 tons of ore. The South Manchurian Railway and the joint Chinese investors are proceeding to erect a 200-ton blast furnace, while the program of building includes 15 more blast furnaces, open-hearth steel furnaces and rolling

*Mining and Scientific Press, Feb. 18, 1911.

mills, the proposed production to be 1,000,000 tons of pig iron and steel per year.

The Hanyang Plant

The Han-Yeh-Ping Iron & Coal Co. has already been referred to as the source of the ore on which the Yawata plant has been operating. This has an iron ore deposit at Tayeh (see map), blast furnace plant at Hanyang, just across the Han River from Hankow, and a coal mine and coking plant at Ping-hsiang, in Hunan. This plant has an interesting history; it was contracted for and erected before ascertaining whether any supply of raw materials was available. At the time I visited it, in 1908, it was making pig iron in two furnaces, turning it into steel in open-hearth furnaces and rolling rails. That year it made a 25 per cent profit but, except for this, it has generally been in financial difficulties. Japanese investors acquired an interest in the plant through a loan, as mentioned.

The recent revolutions in China have so dam-

the enterprise, if successful at all, will be more than a plant of moderate size.

The Yangtse and Shantung Regions

When the Japanese captured Tsingtao they also took over the German-owned coal and iron mines in Shantung. The coal mines had been worked by the Germans but the iron mines were undeveloped, though an iron works was discussed in 1904. W. Koert described these deposits as having an outcrop over a mile long and the deposit as 100 ft. in width, with an iron content of 65 per cent. The first report was that they would immediately be developed by Japanese investors; the latest is that the deposits were greatly overestimated and are probably not worth development. At any rate nothing has yet been done with them.

Another deposit that has been much talked about is that near Amoy. Japanese interests finally secured a concession to this and here again it is now reported that the deposits are not nearly



The Blast-Furnace Plant of Peu-hsi-hu, Manchuria, in the Center with the Coal Washing Plant in the Background

aged the plant at Hanyang that extensive alterations are necessary and strenuous but unsuccessful efforts were made to interest American capital. Recourse was then made to Japanese capital and the terms on which the latest advance was made provided that the technical control should be in the hands of the Japanese. It was proposed to build a new smelting plant but this has not been done, which serves to confirm rumors that the ore body is much smaller than was hoped for and that the coal mine at Ping-hsiang is giving out. It will be remembered that this plant figured in the 21 demands of the Japanese ultimatum of May, 1915.

To the east of Tayeh, at Tao-chang, in An-hwei, is another iron deposit to which B. Nakano has secured a concession. At the last report he was floating the Oriental Steel Co. as a popular subscription in Japan, the holdings of an investor being limited to 50 shares. Various reports of the size and grade of this deposit have been given out and, like most reports, are doubtless much overestimated. It does not seem likely that

as valuable as hoped. It is possible, of course, that these pessimistic reports are as much in error as the first optimistic reports; I give them for what they are worth. The net total inference seems to be that the Yangtse and Shantung regions are proving somewhat disappointing as a field for Japanese exploitation. The Manchurian deposits seem more promising, especially those at An-shan-chang, if the latter are anything like as good as reported.

Japan's Resources and Consumption

To summarize it may be said that the iron and steel industry of Japan is dependent on ores mined on the Asiatic mainland. One company is now operating in Manchuria and is planning to extend its operations and another very ambitious one is proposed. Large things have been expected of the other deposits in China which Japanese interests control, but the outlook for them seems not particularly bright. Working costs in the plants now in operation are not low, in spite of the low cost

of labor, since the labor is relatively inefficient and fuel costs are also rather high. With longer experience probably a better showing will be made in this regard, but on the face of it it would seem that the best that can be expected of the Japanese steel industry in the next few decades is sufficient expansion to take care of the growing Oriental consumption.

I am indebted to H. Yoshikawa, assistant professor of metallurgy in Tokyo University, for the following estimate of the consumption of iron and steel in Japan, taken from the report of the commission appointed a short time ago to investigate the iron and steel industry:

Estimated Iron and Steel Consumption in Japan, in Tons		
Year	Pig Iron	Steel
1918.....	360,900	1,113,000
1920.....	430,000	1,295,000
1923.....	533,000	1,668,000
1925.....	617,000	1,786,000
1928.....	744,000	2,112,000

The steel figures do not include imports of machinery, railroad cars, ships and other finished products.

Future Production and Supply

The total domestic production of iron and steel in Japan was 490,000 tons, of which the Yawata plant furnished 280,000 tons. The plant at Pen-hsi-hu now produces about 50,000 tons of pig iron per year, but it is planned to double it this year and the eventual proposed capacity is 400,000 tons per year, and a steel plant is to be built. If the An-shan-chang enterprise lives up to the plans made for it and eventually produces 1,000,000 tons of steel per year the hoped-for supply will not exceed Japanese consumption, leaving no surplus for the rest of the Orient. On the other hand, if American and European plants, expanded to meet war-time needs, make a determined drive at over-seas markets after the war it is quite possible that the enterprises just discussed will be hard pressed to meet price competition. Trade facilities and freight rates will then come into play and the country which owns the most ships and can operate them most cheaply is likely to fare the best in the struggle for Oriental steel markets.

Electrical Engineers' Meeting

On Saturday, May 18, a joint session of the Pittsburgh and Cleveland district section of the Association of Iron and Steel Electrical Engineers will be held at Youngstown, Ohio, and will take the form of an inspection trip to the Ohio Works at Youngstown, and the new McDonald Works at McDonald, Ohio, of the Carnegie Steel Co. The inspection party will assemble at the Ohio Hotel, leaving at 10:30 a. m. for the Ohio Works, which will be inspected, after which a luncheon will be served through the courtesy of the Carnegie Steel Co. The party will then go to the McDonald Works. It offers a typical example of how efficient engineering organization and co-operation assisted by executive administration may succeed in building up one of the largest and most modern steel mills of the day.

Included in this plant is the following equipment: six self-cooled, 8000 k.v.a. 25 cycle, single phase, 44000 to 6600-volt, step down transformers, the largest of this type ever built, an 18-in. band mill, 12-in. hoop mill, 14-in. bar mill, each driven with 3000 hp. alternating current motors, with 10 to 20 per cent alternating current speed regulating sets. Committees and guides for escorting the parties through the plants named above will be provided by the Carnegie Steel Co.

DEMURRAGE CHARGES

Delaware River Steel Co. Loses in Complaint Against Railroad Company

WASHINGTON, May 14.—The Interstate Commerce Commission is holding consignees of carload shipments to a strict accountability for demurrage charges and is giving an interpretation liberal to the carriers to all demurrage rules. In the case of the Delaware River Steel Co. vs. Philadelphia & Reading Railway Co., which has just been decided by the commission, this tendency is clearly shown.

The complainant is a corporation engaged in the manufacture of pig iron and coke at Chester, Pa. By complaint filed with the commission it has sought relief from liability from alleged unlawful demurrage charges demanded by the carrier for the detention at Chester of numerous carloads of iron ore, coal and other commodities. The steel company performs its own switching within its plant, which is located adjacent to the railroad's South Chester yard and is connected with the railroad by a private interchange track.

During the period in question, numerous carload shipments consigned to the steel company arrived at the railroad's South Chester yard. Upon the arrival of each car, the carrier mailed to the steel company a postal card notice identifying the car by initials and number, point of origin and contents and indicating a readiness to deliver. Without further notice, the cars were subsequently placed in the carrier's storage yard near the steel company's interchange track and after being held there for varying periods, were placed on the interchange track as ordered by the steel company. The charges assailed in this case, amounting to \$1,112, accrued during the periods between the giving of notice of arrival and the placement on the interchange track.

In this connection section A of the carrier's demurrage rules provides as follows:

Section A. When delivery of cars consigned or ordered to any other than public delivery tracks or to industrial interchange tracks cannot be made on account of the act or neglect of the consignee, or the inability of the consignee to receive, delivery will be considered to have been made when the cars were tendered. The railroad company's agent must send or give the consignee written notice of all cars he has been unable to deliver because of the condition of the private or interchange tracks, or because of other conditions attributable to consignee. This will be considered constructive placement.

The steel company's contention is that under this rule the carrier was required to give a notice of constructive placement in addition to the notice of arrival before it could properly assess demurrage charges for any detention of the cars prior to actual placement on the interchange track. The carrier's evidence, which was not controverted, was that during the period in question, owing to conditions arising from the European war, there was an unusual amount of freight arriving for the steel company and other industries at Chester, causing more or less congestion; that the company's yardmaster was at all times aware of the accumulation of cars for the company in the railroad yard and had given explicit instructions to the railroad yardmaster to place no cars on the steel company's interchange track without specific orders to do so; that the cars were held on the railroad tracks in compliance with such instructions; and that each car was promptly placed on the interchange track when the order for placement was received.

The commission finds that the complainant received a postal card notice of arrival covering each of the cars in question and that these notices as a general rule contained sufficient information to enable it to identify the shipments. In view, therefore, of the demurrage rule, above quoted, as well as the extraordinary conditions existing during the war, the commission finds that the demurrage charges assailed were legally applicable.

W. L. C.

The offices of the Abell-Howe Co. are now located in the McCormick Building, Chicago.

The Present Foundry Building in the Foreground; the Pattern Building at the Right; the Power House and Alongside It the Forge Shop, to the Left, and in the Left Background the Machine Shops Communicating with the Erecting Shop



THE ESSINGTON PLANT

New South Philadelphia Works of the Westinghouse Electric & Mfg. Co.

Spurred on by the needs of the Government for ships the Westinghouse Electric & Mfg. Co. has made a record in the erection and operation of its South Philadelphia Works, now devoted entirely to the production of ship propulsion machinery for the Navy and the merchant fleet. A little over a year ago the present site was plowed field; now it contains seven large buildings, which give employment to 2500 people. These buildings, comprising a floor space of over 600,000 sq. ft., include a pattern storage shop, foundry, forge shop, power house, erecting shop and two machine shops.

The location is Essington, or South Philadelphia, about nine miles from Philadelphia, on the banks of the Delaware River. Two steam railroads, an electric line and the river afford means of transportation, though the last-mentioned has not as yet been utilized.

The greatly increased demands on the Westinghouse Electric company for steam-electric generating units led to the necessity of seeking enlarged facilities, as those at East Pittsburgh were already crowded. The South Philadelphia site, embracing 500 acres, was chosen as possessing more desirable qualifications than any other considered. It is expected that eventually this plant will be of a size comparable with the East Pittsburgh works, which now employ in the neighborhood of 25,000 people, and cover a floor space of over 100 acres. A portion of the land will be devoted to a town site capable of accommodating about 5000 people.

An interesting feature is the use of standard gage tracks through the yards and buildings, so that all transportation, whether railway or interworks, is car-

ried on the same tracks, and maintenance of tracks and equipment of different gages is avoided.

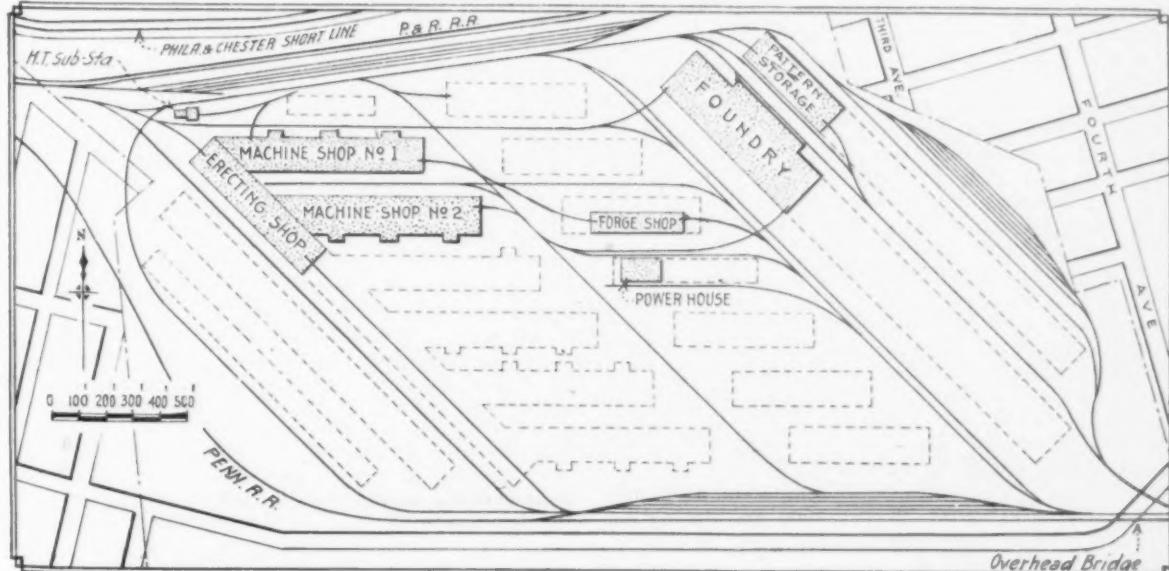
Electric energy for operation of the works is obtained in the summer months from the Philadelphia Electric Company at 66,000 volts, and through the steam turbines in the company's plant in the winter months, when the exhaust steam is used to heat the buildings. Distribution of current is made throughout the grounds at 6600 volts, by means of lead-covered cables laid underground, to substations located in the various buildings. Here it is changed to the current of the proper kind or characteristic for the work to be performed.

The selection of the site and the general direction of all the activities incident to the erection and operation of the plant have been in charge of H. T. Herr, vice-president, who has had as his assistant R. B. Mildon, who has had general supervision of the construction of the plant. The plant has been erected by Westinghouse, Church, Kerr & Co., with which firm Calvert Townley, assistant to president, has handled all business relations, subject to the approval of the president, E. M. Herr.

Brassert Gas Washer for Inland Steel Co.

The Inland Steel Co., Indiana Harbor, Ind., has awarded to Freyn & Co., engineers and contractors, Chicago, a contract for the erection of a Brassert gas washing and drying unit for its No. 2 blast furnace. This will make the second unit of the kind at the plant.

The Brown Instrument Co., Philadelphia, will open a new office at 2086 Railway Exchange Building, St. Louis, June 1 in charge of Paul H. Berggreen, for the sale of its pyrometers and other instruments in the southwestern territory.



The General Scheme of Layout of the Essington Works of the Westinghouse Electric & Mfg. Co. Provides for Extensive Expansion and Intra-Communicating Railroad Facilities

Outlay for Ships Will Be Doubled

Government Program to Be Greatly Speeded and Enlarged — Submarine Boat Co.'s Contract No Longer on Cost-Plus Basis

WASHINGTON, May 14.—Charles M. Schwab, director general of the Emergency Fleet Corporation, appeared before the Senate Committee on Commerce May 8 in the dual role of diplomat and relentless accelerator of the shipbuilding program. His primary object was to set at rest rumors with regard to relations alleged to have existed between the Submarine Boat Co. and one of the steel companies supplying it with material for the fabricated ships of which it has engaged to build 160. Mr. Schwab's secondary purpose was to inform the committee that, with a view to hastening the work in the Submarine Boat Co.'s yard at Newark, N. J., he had canceled all the original cost-plus contracts and had substituted new agreements providing a flat price for each vessel delivered. Members of the committee treated the director general with the utmost consideration and manifested their great satisfaction with the zeal and enthusiasm with which he has undertaken his great task.

Submarine Boat Co.'s Steel Contract

More than a month ago reports reached the Senate Commerce Committee to the effect that there was a community of interest between the Submarine Boat Co. and one of the big steel companies and that the steel company was furnishing material at substantially higher prices than other steel producers were receiving. A call was immediately made upon the Shipping Board for an investigation and report, and subsequently the board forwarded to the committee a preliminary statement concerning the matter. Mr. Schwab assured the committee that if at any time irregular relations have existed between the boat builders and the concern furnishing them with steel, no such relation now exists. The committee did not press the matter further, its members apparently being entirely willing to accept Mr. Schwab's assurance that there is no basis for criticism in present conditions.

Cost-Plus System Abandoned

Taking up the subject of the cost-plus contracts of the Submarine Boat Co., covering 160 vessels, Mr. Schwab told the committee that he had decided in the interest of the speeding up of steel construction, especially in the fabricated yards, to provide himself with a check by changing the Submarine Boat Co.'s contracts to a lump sum basis, while leaving the Hog Island and Bristol yards on a cost-plus basis. He was satisfied, he said, that within a few months it would be practicable to determine the relative merits of the two systems and the Shipping Board would then be in position to take such action as might be deemed necessary. The original contract of the Submarine Boat Co. provided that the Government should furnish certain material, pay all expenses of construction, and allow the contractors a flat fee of \$37,500 for each 5000-ton vessel. Under the new arrangement put in force by Mr. Schwab the vessels will be delivered to the Government for the lump sum of \$960,000, the contractors paying all material, labor and supervision costs, including any increase that may result from market changes. On the basis of ruling prices of material and labor it is figured that the contractors, by the most economical and expeditious operation, can secure a profit of \$50,000, but whether they will be able to net so large a margin on ships to be built later remains to be seen.

New Deal Will Speed Work

When the original contracts of the Submarine Boat Co. were let in September, 1917, it was estimated that a 5000-ton ship would cost: For materials, \$350,000; for direct labor, \$200,000, and for overhead expenses, \$200,-

000, or a total of \$750,000. On this basis a profit of 5 per cent was allowed, or \$37,500, and it carried with it a guaranty against any increase in the cost of materials and labor.

Inasmuch as the new contract basis adopted by Mr. Schwab for the work allotted to the Submarine Boat Co. involves a flat price of \$960,000 per vessel at an estimated profit of \$50,000, it would appear that the new arrangement is more advantageous to the contractors than the old. Mr. Schwab is confident, however, that it will prove more economical to the Government in the long run. He figures that to build a 5000-ton steel ship to-day will cost: for materials, \$400,000; direct labor, \$280,000, and overhead expenses, \$230,000, or a total of \$910,000, exclusive of the \$50,000 contractor's fee. The director general does not believe that under the original contracts any of the fabricated ships would have been completed at the Newark yard at a cost of \$787,500, and he thinks that the average cost of the 160 vessels would probably have exceeded the new flat price of \$960,000. All temptation to spend the taxpayers' money freely in overcoming obstacles that might be disposed of through the skillful application of engineering talent and by stimulating the workers to their best efforts is removed by abandoning the cost-plus form of contract, and as the contractors by speeding up the work can earn their fees in less time and thus save on overhead cost, etc., there will be a strong inducement to them to push construction on as rapidly as possible.

Ship Program to Be Doubled

That the Shipping Board will undertake to spend twice as much money during the fiscal year beginning July 1 next as heretofore estimated has been made clear by a communication from Chairman Hurley forwarded to Congress by the Secretary of the Treasury calling for \$2,223,000,000 for the construction of ships and \$835,000 for salaries and other expenses of the Shipping Board during the fiscal year ending June 30, 1919. When the board's budget was made up last October to be used as a basis for appropriations at the present session for the fiscal year beginning July 1 next, it was believed that \$900,000,000 would not only cover the cost of ship construction for twelve months but would represent as many ships as possibly could be built in that length of time. Since Mr. Schwab took hold of the Emergency Fleet Corporation, however, he has succeeded in demonstrating to the board that many more ships are needed, that existing yards can be greatly expanded, that new shipyards can be built and equipped in this country, and, last but not least, that foreign shipyards can be levied upon for a very substantial contribution to the program. The estimate just forwarded to Congress, therefore, represents a revision not only of figures but of methods and foreshadows the accomplishment of Mr. Schwab's prediction made soon after he assumed his new post, that the year 1919 would witness an increase of not less than 100 per cent over the output of 1918.

Of the big appropriation of two and a quarter billions now estimated for, the sum of \$1,386,100,000 is to be utilized "for the building of new merchant ships under contract with the Emergency Fleet Corporation." In addition the board asks for \$652,000,000 "for the requisitioning of ships on the ways and materials for completing ships in the yards." Judging by the launching of the collier Tuckahoe in 27 working days after the laying of her keel, it will only be a short time before the Emergency Fleet Corporation's contracts will begin to come through. The standardization and simplification of design adopted for the fleet corporation's cargo vessels has proven a factor of tremendous importance in obtaining early deliveries. The command-

deered ships were of a hundred different types and, while in many cases the designs were modified and all elaboration abandoned, it has not been possible to build them at the same rate as could be maintained in the construction of standardized cargo vessels.

Japan to Build American Standardized Ships

The presentation of the Shipping Board's estimates to Congress has disclosed the interesting fact that a considerable proportion of the tonnage which Japan has promised to furnish the United States is to be built in Japanese shipyards under direct contracts with the Emergency Fleet Corporation and will follow standardized American types, the ships being from 6000 to 9000 tons capacity. These vessels, which will number 50, are to cost \$78,000,000, and the board estimates that approximately \$23,000,000 of this sum will be due the builders before June 30 next. This tonnage is in addition to 100,000 tons of ships which the United States has arranged to purchase from Japan, making 480,000 tons in all. Japan's contribution to our merchant navy will be still further increased by 150,000 tons of chartered ships.

Considerable interest has been aroused here by an offer from persons whose responsibility is said to be unquestioned to build and equip a shipyard in Cuba with a view to taking contracts from the Emergency Fleet Corporation for a large tonnage of cargo vessels. This project, which may involve the building of blast furnaces, steel works, etc., in Cuba to use iron ore from the extensive deposits in the island, has been urged upon the Shipping Board with some decidedly ingenious arguments. It is claimed that, while skilled labor would have to be taken to Cuba, there is an ample supply of common labor, while the transportation facilities between the island and the United States are adequate for the largest sort of project. One point strongly urged is that a shipyard could be operated in Cuba the entire twelve months with 100 per cent efficiency owing to the mild climate. The Shipping Board has not been greatly impressed with the Cuban shipyard project thus far.

That the Emergency Fleet Corporation intends to test out thoroughly the practicability of concrete steel reinforced ships is demonstrated by the estimates submitted to Congress which include an item of \$35,000,000 for the financing of concrete shipbuilding plants. The largest of these vessels recently launched on the Pacific coast is apparently a success, at least so far as it has been possible to provide tests, and her builders have been awarded a contract for another ship of the same type of 50 per cent greater tonnage. The estimates also include \$5,000,000 "for enlarging and repairing shipyards" and \$50,000,000 "for the housing of shipbuilders."

The month of April saw the new American merchant marine increased at the rate of a little more than 9000 tons of shipping daily, according to figures given out by Eugene T. Chamberlain, commissioner of navigation. Mr. Chamberlain's records show a total of 240,000 dead-weight tons constructed during the month of April. Two-thirds of this total tonnage (157,333), his report adds, was constructed during the last half of the month. The men in the shipyards are said to be working loyally to maintain this increased production. The indications are that the United States will surpass Great Britain in output of tonnage during May and practically all the subsequent months of the current calendar year.

W. L. C.

Charles B. Bohn, formerly manager of the Detroit plant of the Aluminum Castings Co., has organized the Charles B. Bohn Foundry Co., Detroit, which is establishing a plant on Hart Avenue for the manufacture of brass, aluminum and bronze castings.

The Velick Scrap Iron & Machinery Co., Detroit, is now occupying its new quarters at Medbury Street and Grand Trunk Railroad. Goodman Velick is president.

War Industries Commission Completes Organization

The War Industries Commission of the Cleveland district, comprising northern Ohio and the three western counties of Pennsylvania, has completed its organization by the election of J. H. Foster, president Hydraulic Pressed Steel Co., chairman; C. A. Otis, treasurer, and W. E. Tousley, secretary and assistant treasurer. Offices have been opened in the Cleveland Chamber of Commerce. The Cleveland district covers the territory of one of the districts in which the country is divided by the United States Ordnance Department. The Cleveland district is territorially divided into eight divisions, and each division has been organized similarly to the War Industries Commission of Cleveland. The manufacturers represented in the organization will be grouped in various classifications including automobile, castings, machinery and machine products, forgings and stampings, engineering, textile and other industries. In addition to the main office in Cleveland, each division will have an office in the city that has been designated as headquarters of the division.

One of the objects of the organization is to enable the Government to get maximum production from the small factories, as well as from the large industrial plants. It is pointed out that heretofore small manufacturers have been handicapped in securing Government business, as the capacity of their plants did not warrant their going to the time and expense, often involving trips to Washington, to seek Government contracts. Under the centralized plan, specifications will be sent from Washington to the Cleveland office, and by that to the chairman of each division by whom it will be distributed to the manufacturers in that zone that are equipped for the particular work. It is believed that the organization will prove not only an efficient aid to the Government, which needs the full capacity of the plants, but also to the manufacturers themselves, as many of the latter are doing only a small percentage of Government work either directly or indirectly, and either must take on Government orders or face the danger of having to close their plants owing to inability to secure steel and pig iron.

The executive committee is composed of one member from the city named as center of each division. These include J. H. Foster, Cleveland; Thomas DeVilbiss, president DeVilbiss Mfg. Co., Toledo; W. D. Bradley, Lima Steel Castings Co., Lima; J. H. Frantz, American Rolling Mill Co., Columbus; C. L. Eshlerman, Union Metal Mfg. Co., Canton, and O. G. Hitchcock, Hayes Mfg. Co., Erie. Another member representing Youngstown is still to be selected.

Business Papers Discussed

An educational exhibit telling in panel displays the story of the business press and the part it plays in supplying information of great value to manufacturers and distributors in various fields was held in Cleveland at the rooms of the Cleveland Advertising Club, April 29 to May 4, under the direction of the Business Paper Division of that club. The week was designated by the club as Business Paper Week, and attractive souvenir brochures were sent out with invitations to manufacturers and others interested. The exhibitors included nearly all the important trade publications of the country.

Supplemental to the exhibit two noon-day luncheon meetings were held, during which interesting talks were made by men prominent in the business paper and manufacturing fields. The speakers and their topics were: Arthur J. Baldwin, president Associated Business Papers, Inc., "The Business Papers' part in Winning the War"; Samuel O. Dunn, editor *Railway Age*, "What Industry Can Expect from the Railroads"; C. F. Lang, president Lakewood Engineering Co., Cleveland, "Business Papers from the Manufacturer's Standpoint"; H. E. Cleland, advertising counsellor McGraw-Hill Co., "The Publishers' Responsibility."

Commercial Relations of Allies with Russia

The Practical Problem of the American Manufacturer in the Light of the German Invasion—Co-operation by Banks

BY STERLING H. BUNNELL*

THOUGH the west front of the Central Powers is the main military theater of operation, and the south and southeast lines are almost equal in importance, Russia still remains an important factor in the great war. The east front still exists, even though it has ceased to be a fortified line of demarcation between two opposing forces, and has widened into a vague, nebulous area stretching far into Russian territory. Over this area small German armies move almost without opposition, and German commercial agents penetrate into all parts of the region and, more or less disguised as Russian citizens, search out ways of developing trade for the benefit of the Prussian plans of world dominion.

Military action by an organized Russian army on the eastern front of the Central Powers is in truth impossible; disintegration has gone too far. But we, the Allies, cannot afford to abandon the Russian front as defeated powers. That would be to hand over to the enemies of civilization resources in materials and men that would make Prussia a modern imperial Roman state, appointing Hindenburgs, Falkenhayns and Ludendorffs as rulers of the subject nations and levying tribute on all countries of the earth. This is no mere nightmare vision; it is the logical development of the imperial pan-German scheme. Its fulfillment can be prevented only by Allied success, both on the west front, by the Allied armies, and on the east front, by maintaining Russia as an independent and self-governing nation free from Prussian domination.

The Allied military campaign has failed on the east front. The failure cannot justly be alleged to prove incompetency of Allied leaders, for it came about in spite of their best efforts through the effect of divided counsels and treachery in the Russian imperial government.

Russia's Dependence on Germany

In the progress of civilization during the past 50 years Russia's growing wants had come to be supplied by imports from manufacturing nations, and only a small part by the organization of Russian factories. The German government knew how to adapt peaceful commerce to its imperial plans, and so the declaration of war found Russia dependent on her enemies not only for munitions and military supplies, but also for machinery, railroad equipment, leather, textiles and many common necessities manufactured in other countries, often from raw materials produced in Russia. The final breakdown of the Russian nation came about through the privations suffered by the common people, principally the workers in the large cities, though the army was fairly well supplied. The opening of the new Arctic Ocean port at Kola Bay, with the Murman Railroad to Petrograd, and the great extensions of facilities at Archangel and Vladivostok provided only trifling connections compared with the transportation routes through the Black Sea, Baltic Sea and overland from Europe which used to convey imports to the Russian people. By the time of the revolution the army was only a crust over the emptiness within the country, and it seems now, looking back on the events of the past twelve months, that the void behind the army was too large for any human effort to fill. Ships as well as supplies were none too easily spared from Allied countries and both the northern and eastern ports of Russia required long railroad hauls to reach the masses of the population. Privation was the chief and final cause of the Russian breakdown.

*Chief engineer, R. Martens & Co., Inc.

Obviously any proposal to put an Allied army on the eastern front in place of the Russians is absurd. An adequate army could not be transported across Russia, nor be kept supplied with food and munitions, and the Russian population in the present state of want could be kept from attacking the army stores only by such methods as are applied in Belgium by the Germans. But as the Russians in their present destitution may be expected to resent the presence of a well supplied Allied army while the Russian population remains in want, it is certain that nothing but supplies of clothing and other goods to be imported from Germany and Austria could reconcile them to the presence of German and Austrian forces in their cities and towns. We have no evidence of the smallest intention on the part of the conquering Prussians to earn the good will of subject peoples in the case of Belgium, Serbia, Roumania or any other invaded territories, and they will hardly change their methods in Russia; so that abject want will continue to prevail in that unfortunate country. Perhaps the best thing for the future of democracy will prove to be the lesson that the soldiers of the Central Powers will teach the Russians who opened their own friendly doors to the Huns.

Meanwhile, Lenin, Trotsky, and others, many in German pay, are carrying on a campaign of hate against the former Allies of Russia, the United States included. It will not help the future cause of democratic government if we passively allow the Russian people to include Allies and Central Powers in one general condemnation as foreign nations who fought out a "capitalists' war," refusing help to Russia in her extremity. Even though national antipathies do not last forever, the advantage in reconciliation would in the end be with Germany, close at hand, and against the more distant nations. Unregenerate Germany as a close ally of Russia would be a tenfold greater menace to world peace and our own than ever before.

Our Interest in Being Friendly to Russia

Every interest we have—military, political and commercial—lies in making friends with the Russians and assisting them through their present disorganization. Manufactured goods they must have at any cost. In Russia, faced with impending famine, plows are worth more than diamonds. Boots, clothing and household supplies are stolen in preference to silver and jewels. Commissioners from Russia are in America even now, trying to obtain necessities in enormous quantities. We may be sure that the Germans are straining every resource of their reduced industrial equipment to supply manufactured goods in exchange for Russian foodstuffs, and that however hard the bargains they drive they will hereafter take care to impress the Russians with the fact that German goods helped them in their need. The only possible counter to the impending commercial drive is a comprehensive plan to put into Russia without delay quantities of goods of Allied manufacture at least equal to German goods in quality and price.

Bolshevik Obstacles

The obstacles to be overcome are, first, the existing laws of the Bolshevik Government of Russia forbidding importation of foreign goods and foreign exchange transactions, and second, the lack of stable value in Russian roubles. In spite of these prohibitions, goods have been sent into Russia under special permits secured in various ways, and payment has been made by subterfuges. Valuable furs, platinum, gold and other portable property have been brought out by traveling agents, and sold to provide funds to pay for goods

imported into Russia. Usually the transaction is completed by selling the imported goods in Russia for roubles, and using the rouble funds to pay the Russian sellers of the exported valuables. The trade thus becomes a barter of goods for goods, and no exchange of money of different countries is involved.

We are hearing much of the restriction of non-essential industries in favor of war work. But we hear also that our Government is providing for the continued manufacture of pianos, because these are desired in South America in payment for nitrates and other essentials of the war. The same reasoning applies to the manufacture and sale of necessities for Russia. By organizing a large export trade with that country with the least possible delay we can provide the Russians with means to resist German commercial aggression by making them independent of German manufacturers. If it was wise to provide the Russian Imperial Government with millions of dollars' worth of shells and army supplies for destruction in the operations of military offense and defense, it is just as wise to continue to spend money in resisting the commercial tactics of the enemy now that the military situation is at an end. The commercial offensive will cost only a fraction of the amount already spent by the Allies in outfitting the Russian army.

How Co-operation Can Be Effective

The practical American manufacturer will naturally ask what he can do to help in the national interest and what that help will cost him. The answer is that no sacrifice whatever is needed; his part will be nothing else than to make and sell to Russia as much as possible. The legal restrictions in Russia can no doubt be removed by negotiation through consulates, or avoided by dealing through Russian co-operative societies which have power to obtain permits for the goods they export and import. The financing will require the aid of banks in Russia and in America, for the purchase and sale of exports and imports should go on simultaneously in both countries, and the goods must be carried on credit over the term required for transportation and sale.

The scheme is broadly co-operative and would preferably be national—or international—in scope. The Russian products for export do not form raw materials for the manufacture of the goods to be imported into Russia, therefore, the purchasers of the exports will be other parties than the sellers of the imports. Money will change hands in the processes of purchase and sale, and in America and in Russia, but not between the countries. In Russia the fluctuating value of the rouble may make it desirable to contract simultaneously for purchase and sale, in which case the actual gold value of the rouble will be of no consequence.

Russian Poverty

The American business man frequently expresses the opinion that Russian export trade is finished; that it will take years for the Russians to put their affairs in order; and that however great their needs, they have no money to buy anything from abroad. Probably none of these opinions are correct, but if they were we must nevertheless trade with Russia. Our indifference to Russian affairs passed away with our "splendid isolation," when we found the ocean too narrow to separate us from the menace of German ambition. Many American shops and foundries have operated with great success by employing Russian immigrant labor. Given a free hand to train and employ many millions of the same steady, patient and faithful workers, the German industrial leaders would soon control the world's markets and be in position to undersell and wreck the industries of other countries, one after another. The Russian in America, like other immigrants, adopts our average standards of life and increases his purchasing power. Under Prussian mastery he would become an efficient automaton of the German type, and be a unit in the mass trained to roll over and crush the non-German portion of the world.

Reasonable, intelligent government in Russia will probably commence its formation soon, and will become completely organized within a short period of time after the process once begins. It is of the greatest importance that the United States shall be recognized by the Russians as friendly to all efforts to establish a really democratic government of whatever form they may choose, provided only the reasonable obligations of the nation to other nations be carried out. In the process of reorganization imported supplies will be necessary in order that domestic and industrial life may be resumed and the intolerable discontent of the population may be relieved. Payment for the supplies can easily be arranged, even though the Russian national debt already runs into figures which by their hugeness have frightened the Bolshevik leaders into declaring repudiation.

Potential earning power has brought financial assistance to many a corporation staggering under a load of debt. The Russian national situation is not at all bad from the financial standpoint. The receiver must realize on some of the assets, like the flax, bristles, hides and other products of which Russia has supplies far beyond her capacity to manufacture. By the sale of these, clothes and tools may be provided, sufficient to start the people to work again, and affairs will begin to mend. Before the available goods can be got out of Russia and turned into imported necessities, there will be time for new international loans to be arranged and expended in locomotives, rolling stock and machinery to start the normal currents of Russian activities into action once more.

Every shipment of goods we make to Russia will have its effect in establishing friendly feelings toward ourselves and our Allies and tend to strengthen the resistance to German aggression. If American manufacturers will hold themselves in readiness to take advantage of possible trade openings a volume of business can be developed between America and Russia which will become an important factor in winning the war. For this purpose plans are already under consideration by national associations, merchants, banks and co-operative societies, working in conjunction in both Russia and America.

Labor Housing Problem in Calumet Region

Civic authorities and employers of Hammond, Ind., where the Standard Steel Car Co. has built a great munitions plant, are keenly disturbed over the lack of adequate housing facilities for the thousands of men who are flocking there. The big plant of the car company is virtually a Government proposition. The local press of Hammond has been agitating in the hope of arousing local interests to build houses, but without the desired result. It was predicted that the Government would build houses or barracks at Hammond, but now belief is growing that it will seek rather to improve transportation, so that thousands of men can live in Chicago, and thence go to their work in Hammond, East Chicago and Whiting.

In the *Calumet Record*, O. M. Eidritz, director of housing and transportation of the Department of Labor, is quoted as saying:

It is a matter of much concern to all governmental departments interested in housing that the various communities are getting a wrong idea as to the intent of the Government in connection with relieving the demand for housing in various communities.

It may happen that a reasonable amount of temporary building may be introduced to meet the emergency and take the peak load. In any event, new houses will not be considered until every other means has been exhausted.

There is reason to believe that where a community is overloaded with war contracts, its chance for receiving additional Government contracts is remote, as it naturally would be useless to offer additional contracts to a community whose manufacturers are already unable to find housing for their workers.

If workers can be induced to come from outlying towns or hamlets, and transportation can be improved, to enable these workers to reach the industrial plants in the locality affected, this method should be employed.

HIGHER TAXES PROPOSED

Congress Is Not, However, to Pass Legislation at the Present Session

WASHINGTON, May 14.—An urgent recommendation by Secretary McAdoo for the enactment at the present session of Congress of supplemental revenue legislation designed to produce between \$2,500,000,000 and \$3,000,000 has aroused a strong protest in Congress on the ground that such action would be premature in view of the condition of the nation's finances and would only serve to demoralize the commerce and industries of the country by the imposition of an uncalled-for burden at a time when financial resources are being tested to the utmost to meet the demands of the war and the essential needs of the people. So reluctant are the Congressional leaders to adopt Mr. McAdoo's revenue project, which would involve a protracted session of Congress running well into the fall, that they have taken the matter to the President and will postpone action until a conference can be had between the Chief Executive, the Secretary of the Treasury and the leaders of the Ways and Means and Finance Committees.

Secretary McAdoo's figures as presented to Congress indicate a minimum expenditure during the fiscal year beginning July 1, next, of \$23,000,000,000, but it is intimated that this figure may be increased by six or eight billion dollars as the result of a speeding up in the production of ships, heavy ordnance and airplanes. The Treasury's estimate includes Secretary Baker's recommendation for \$15,000,000,000 for the War Department, \$1,500,000,000 for the Navy, \$2,250,000,000 for the Shipping Board, from \$1,000,000,000 to \$2,000,000,000 for the airplane program, and a large number of items for the other executive departments far in excess of their normal requirements. The significant feature of Secretary McAdoo's schedule is the large percentage increase in the leading items over the expenditures for the current fiscal year ending next month. How the money can be spent is a problem to which the Congressional leaders are addressing themselves and which, in view of the experience of the past ten months, does not seem to be in a fair way of being solved.

Impartial examination of the situation forces the conclusion that the Treasury Department is seeking to expedite revenue legislation at the present session chiefly in order that the administrative difficulties attending the execution of the new law may be minimized and the department experts given ample time in which to work out collection systems, forms, records, etc. The recent experience of the Commissioner of Internal Revenue in the effort to devise rulings for the execution of the excess profits tax law has undoubtedly spurred on the Treasury authorities to seek new revenue legislation at the earliest possible moment not only because of the need for funds, which is open to serious doubt, but also to enable the agencies for the collection of taxes to prepare the necessary machinery. Incidentally the department is also anxious to bring about an early revision of the excess profits tax law and to consolidate the income tax statutes of 1916 and 1917. The revision of these laws would greatly simplify the work of collection and would furnish a basis for additional taxation, which could be semi-automatically increased by raising rates without modifying the present bases. These considerations naturally appeal to the men responsible for collecting the taxes, but they are accorded little weight by Senators and Representatives who cannot understand why more revenue should be provided when the executive departments have been unable to spend the appropriations so liberally voted during the past year, leaving large sums still in the Treasury which can be substantially increased whenever necessary through the exercise by the Secretary of authority heretofore vested in him.

President Wilson's slogan of "pay as you go," as applied to the financing of the war, has been adopted by Secretary McAdoo, however, and it is believed that while the Congressional leaders may force the postponement of additional legislation until December, the

present Congress will add from \$1,500,000,000 to \$2,000,000,000 to the burden of taxation. If this is done, taxes will produce \$6,000,000,000 to \$6,500,000,000 per annum, or considerably more than 25 per cent of the fabulous estimate of \$23,000,000,000 now made for the national expenditures for the fiscal year beginning July 1, next.

Echoes of the Liberty Loan Campaign

Every employee of the Moller & Schumann Co., Brooklyn, subscribed to the third Liberty Loan and its industrial honor flag contains ten stars.

The employees of the Brooklyn plant of the Doepler Die-Casting Co., subscribed to the third Liberty Loan to the extent of \$56,000.

Every one of the 2800 men employed in the different departments of the Boston Navy Yard, Boston, subscribed to the third Liberty Loan. The quota for the yard was \$300,000 and the total subscription amounted to \$812,550.

The 1581 employees of the Central Iron & Steel Co., Harrisburg, Pa., subscribed for the third Liberty loan and raised a total of \$142,000. The company, in addition, made a purchase of \$100,000 bonds, the sum which it has bought of each of the loans. To signalize the fact that 100 per cent subscription was obtained a half holiday was declared and the employees paraded in Harrisburg.

Industrial concerns at Newark, N. J., and vicinity gave enthusiastic support to the third Liberty loan during the final week. Among the subscriptions recorded were: Rail Joint Co., \$50,000; Hammered Piston Ring Co., \$10,000; employees of the Art Metal Works, \$10,000; employees of the Babcock & Wilcox Co., Bayonne, \$235,000; employees of the Post & McCord Co., New York, engaged in erecting buildings at the plant of the Federal Shipbuilding Co., Kearny, subscribed \$30,000 at a Liberty loan rally held during the past week; Standard Motor Construction Co., Jersey City, \$100,000; employees, \$50,000; American Smelting & Refining Co., Perth Amboy, and employees, \$111,700.

The Burroughs Adding Machine Co., Detroit, subscribed \$250,000 to the third Liberty loan. Its president, John Boyer, subscribed \$100,000 personally, and employees subscribed for \$235,000.

At Hamilton, Ohio, 250 employees of the Hamilton Furnace Co. subscribed for \$25,000 worth of Liberty bonds.

The Liberty loan drive at the plant of the Landis Tool Co., Waynesboro, Pa., lasted four days and 95.9 per cent of the employees purchased bonds. The Liberty loan parade was one of the largest ever seen in Waynesboro, which was awarded the honor flag.

Every employee of the Sprague Electric Works of the General Electric Co. on May 1, 1482 men and women, subscribed to the third Liberty loan. These subscriptions aggregate \$116,850, or an average subscription of \$78.85 from each employee.

In the third Liberty loan campaign the employees of the Berger Mfg. Co., Canton, Ohio, subscribed for a total of \$112,750 worth of bonds; 98.8 per cent of the employees subscribed. This campaign was conducted by about 75 team workers organized into six different teams.

The Liberty loan went over the top in Philadelphia by about \$40,000,000, the city's quota being \$175,000,000. Group No. 1, comprising iron, steel and allied companies, of which William Breeden, district manager for the Lackawanna Steel Co., was chairman, raised a total of \$17,500,000, its quota being \$16,000,000. This was one-tenth of the total sum subscribed in the city. The Midvale Steel & Ordnance Co. was the largest subscriber, taking \$4,000,000 for the company and \$2,000,000 for employees. The Baldwin Locomotive Works subscribed \$1,000,000 for the company and \$1,000,000 for employees. The William Cramp & Sons Ship & Engine Building Co. subscribed \$1,000,000. Employees of the American International Corporation Shipyard, Hog Island, subscribed for a total of \$750,000.

THE BURNING OF STEEL

What It Means—The Different Ways in Which It May Occur

"THE BURNING OF STEEL" was the subject of a paper by W. H. Cathcart of Glasgow, Scotland, before the Cleveland Institution of Engineers at Middlesbrough, England, in which the author expressed the opinion that the existing definitions of burning were somewhat ambiguous and confusing.

Dr. Stead has proved conclusively, the author said, that steel heated to above the point of incipient fusion may be restored if there is no intergranular oxidation present and that there can be no restoration when the latter condition exists. The term "burnt" has been applied to steel in either of those conditions, but in his opinion it would be in the interests of practical men if some distinction were made between the different kinds of burning.

Broadly speaking, there are three different kinds or conditions of burnt steel:

Burnt, meaning oxidized during heating.
Oxidized during subjection to mechanical treatment while at a temperature above that of incipient fusion.
Heated to above the point of incipient fusion without oxidation.

The oxidation to which he referred was intergranular oxidation, which could take place only when the metal was heated excessively high.

The speaker then discussed what took place when a piece of steel is heated to an excessively high temperature. When the metal reached a red heat, oxidation of the surface began, he explained, and at first took the form of thin scales which peeled off from the surface, but presently the chemical action became so vigorous that a portion of the metal disappeared. Then the metal began to froth up or boil on the surface, the surface layers becoming so liquid that the oxygen from the air easily penetrated, forming bubbles or blisters which burst, leaving cracks or fissures, the walls of which were covered with films of oxide. This was true burning.

A little reflection would show that after the steel had reached the point of incipient fusion the gradual heating would cause a corresponding lessening of cohesion in the bodies of the crystals, and that the stage at which the earlier small globules formed would coincide with the development of the small cracks or fissures if the metal be then subjected to mechanical treatment. Further, the steel would fly to pieces when the prolonged heating had caused excessive liquation at the boundaries of the crystals, thereby reducing the force of cohesion to a minimum. Clearly, then, since there was a relatively large amount of carbon present in tool steel, and correspondingly of liquid surrounding the crystal at the point of incipient fusion, that was the reason why high-carbon steel was so much more easily burnt than mild steel.

As to the different ways in which steel could be burnt, and to distinguish between burnt steel which could be restored and that which could not, the speaker remarked that first, there was the case in which intergranular oxidation must take place in the outer envelopes. This frequently occurs while heating too rapidly in a smith's fire or when the flame impinges too sharply on the corners of the billets in the forge furnaces. If forged in this condition, steel would develop cracks on the surface, and would otherwise present a more or less roughly pitted appearance.

Mr. Cathcart instanced two cases in which there was no intergranular oxidation during heating. Two pieces of steel were placed side by side in a furnace and were carefully heated to above the point of incipient fusion in a non-oxidizing atmosphere. On removing one from the furnace and subjecting it to mechanical treatment, it would either develop cracks all over the edges or would break up completely. The cracks would permit the penetration of oxygen from the air, and again there was evidence of oxidation. What was the effect of allowing the companion piece of steel

to cool down in the furnace to below the point of incipient fusion? It would be found to work all right. The liquid burns, a direct cause of the cracking in the first piece, would have time to solidify again, and the steel would behave much the same as if it were cooled down from the molten temperature for the first time in its life.

Auxiliary Coal Unloader and Conveyor

A scheme for handling coal and similar material from a railroad siding to the storage pile or in industrial plants, has been developed by John F. Godfrey, Elkhart, Ind. The

principal feature of the arrangement is a self-dumping bucket which runs either on a cable or is swung from an overhead track of the I-beam variety. The wire cable type of conveyor is, of course, readily portable and uses only a single endless rope for hauling the bucket back and forth. For regulating the point of discharge of the bucket a movable trip, designed to engage with the projection at the right side of the bucket, is fastened either to the cable on which the bucket carriage travels, or on the I-beam.

In connection with the outdoor conveyor, the coal is dumped from the hopper of a car on the railroad siding to the bucket, which is lowered to a pit alongside the track. When the bucket is loaded it is hoisted and travels along the cable to the storage pile. The bucket, if desired, can also discharge into a wagon on the ground or can be used for reclaiming material from the storage pile and loading it on either cars or wagons. Another application is for handling ashes from a boiler room to a car on a railroad siding or other means for removing the material. It is pointed out that in all cases the bucket lowers before discharging its load, thus avoiding any likelihood of the material being crushed or broken by dropping from a relatively great height.



Coal and Similar Materials Are Handled by a Self-dumping Bucket Traveling on a Monorail Track and Lowered at Any Desired Point by the Action of an Adjustable Trip

New Machine Tool Agency Incorporated

The Machine Tool Engineering Co., Singer Building, New York, has been incorporated for \$100,000 by L. Stewart Love, formerly sales manager for the Sherritt & Stoer Co., machine tool dealer, Philadelphia, and George A. Steinle and Edward L. Steinle of the Steinle Turret Machine Co., Madison, Wis. The company will conduct a machine tool business and specialize in complete manufacturing equipments for machine shops, press shops and forge shops. It has acquired the following agencies for the New York territory: The Steinle Turret Machine Co., Madison, Wis.; Hamilton Machine Tool Co., Hamilton, Ohio; the Mueller Machine Tool Co., Cincinnati; the Cincinnati Iron and Steel Co., Cincinnati, and Beaudry & Co., Boston.

GOVERNMENT HOUSING DETAILS

Nine Different Types for Permanent Construction and the Restrictions Imposed

WASHINGTON, May 14.—The Bureau of Industrial Housing and Transportation of the Department of Labor, created for the purpose of providing living accommodations for workers at munition plants and other establishments having Government contracts, has adopted a series of standards for permanent construction that will be enforced as to all the housing to be provided under the \$60,000,000 appropriation granted by Congress. In the determination of these standards the bureau has had the advice of more than a score of the leading architects, sanitary engineers and landscape architects and has studied conditions prevailing at typical plants in all the important districts where the manufacture of munitions is carried on extensively.

Under the provisions of the housing bill the Government has wide latitude in co-operating with plant owners to furnish living quarters. It may purchase, acquire by lease, construct, requisition or acquire by condemnation such houses as may be deemed necessary; it may purchase, lease or otherwise acquire improved or unimproved land; it may equip, manage, lease, exchange or sell any lands or buildings, and it may make loans or otherwise aid plant owners upon terms approved by the Secretary of Labor. It is probable that the general policy will be to require plant owners to furnish the land upon which the Government will build, the structures to constitute a lien upon the land until the property is sold or until it is otherwise disposed of with the consent of the Government. It is understood that the method that will usually be pursued in connection with large housing projects will be to cause a local realty corporation to be organized subject to the supervision of the Secretary of Labor. This will have general charge of construction and fix terms and conditions of rental and purchase, subject to the approval of the Housing Bureau.

Nine Types for Permanent Construction

Nine principal types of houses for permanent construction have been adopted in addition to such dormitories, barracks, etc., of a temporary character as may be necessary to meet special conditions in emergency plants. These types are as follows: Type 1, single-family house; type 2, two-family house; type 3, single-family house with rooms for lodgers or boarders; type 4, lodging house for men; type 5, hotel for men; type 6, lodging house for women; type 7, hotel for women; type 8, tenement house; type 9, boarding house.

Local building codes and ordinances are to be followed, provided, however, that in case local regulations permit or require anything not covered by the standards of the Housing Bureau, the express approval of the bureau must be obtained.

All row or group houses are restricted to a depth of two rooms. No living quarters will be permitted in basements. Brick, terra cotta, stone or concrete will be preferred. Fireproof construction will not be required, but roofs are to be fire-resisting. Drains under houses and 5 ft. outside are usually to be of extra heavy cast iron and it is recommended that soil and waste pipes be extra heavy cast iron or genuine wrought iron. Outdoor water-closets will not be permitted, nor will water-closets in cellars be allowed except where supplementary to other adequate accommodations.

Side-yard spaces between adjacent buildings are to be preferably 20 ft., with a minimum of 16 ft., such space to be increased proportionately for each additional story or part thereof above two stories. If this space is not obtainable because of lot sizes or land values, houses should be built in rows or groups. Rear-yard depth must not be less than height of building nor in any case less than 20 ft., and the minimum distance between backs of houses must be 50 ft. The minimum distance from front of house to front of opposite house will be 50 ft. The general policy to be pursued contemplates allotment gardens where land values are high or dwelling house sites restricted;

where there is plenty of land a sufficient amount will be allowed in each building lot to provide a garden.

Special Provisions for Types 1, 2 and 3

Houses of types 1 and 3 will not be over two and a half stories high, while type 2 will be limited to two stories. When detached or semi-detached all three types will be limited to three rooms deep. The end house of a row may be three rooms deep. Single-family houses of the more expensive type under certain circumstances may be semi-detached or even built in rows or groups. Party walls are to be of brick, terra cotta, stone or concrete.

In types 1 and 2, which are designed for higher paid workers, five rooms are to be provided, including large kitchen, parlor, three bedrooms and bathroom. Dining room and kitchenette may be provided in place of the large kitchen. A four-room type house will be provided sparingly for higher paid workers and for abnormally large families only, a few houses will be allowed with six rooms, including four bedrooms or three bedrooms with parlor convertible into a bedroom. For lower paid workers the four-room type will be preferred with parlor kitchen, two bedrooms and bathroom. In type 3, in addition to the family quarters provided for types 1 and 2, single rooms for lodgers will be allowed and an additional water-closet compartment, including a lavatory, must be provided for the sole use of the lodgers, who are to have access to their bedrooms and to their water-closet compartment without going through rooms designed for the use of the family. One large bedroom is to be provided in each house, 10 x 12 to 12 x 14 ft. The minimum area of small bedrooms is 80 sq. ft., with a minimum width of 7 ft. Parlors will be 10 x 12 to 12 x 14 ft., and kitchens (where there is no separate dining room) 10 x 12 to 12 x 14 ft.

Types 4 and 5

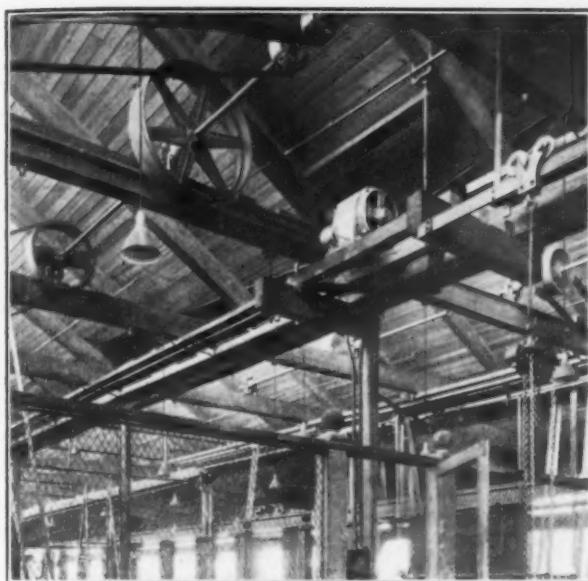
Types 4 and 5, which include lodging houses and hotels for men, are designed to accommodate 75 men or more. The buildings are limited in height to four stories except in large cities, and if over four stories high they are to be fireproof throughout. If over three stories high the first floor construction is to be fireproof. In the lodging houses and hotels, cubicles and dwarf partitions are barred. In each building a smoking room, reading room, billiard room, physician's room, laundry, superintendent's office and quarters will be provided, and unless provided elsewhere in the community a bowling alley will be located in each basement. The hotel type will be provided with dining room and cafeteria with outside access thereto.

Types 6 and 7

Types 6 and 7 covering lodging houses and hotels for women are designed to house from 75 to 150 women each. The bureau is convinced as the result of investigation that with less than 75 lodgers the unit is not economical, while with more than 150 there are difficulties in management and supervision. A somewhat more liberal plumbing installation than required for the like buildings for men is specified. A feature of the women's lodging houses and hotels is the division of the public space into reception parlors or alcoves, one for every 20 women; also provision for sewing rooms and laundries in which the lodgers can wash clothes.

Types 8 and 9

Types 8 and 9 cover tenement and boarding houses. Tenement houses are considered generally undesirable and will be accepted only where it is demonstrated that single and two-family houses cannot be economically provided or where there is insistent local demand for this type of multiple housing. The boarding houses of type 9 are designed to house more than three and less than 25 lodgers. The buildings are not to be over three stories high nor more than two rooms deep except in the case of houses at the ends of rows. Special plumbing installation is prescribed for the family on the same basis as the single-family house with rooms for lodgers. Dwarf partitions between lavatories for women are to extend at least 6 ft. above the floor and have curtains.



The Group Arrangement of Motor Drive Is Employed and All Shafting and Pulleys Are Placed Above the Girders of the Sawtooth Roof, thus Avoiding Interference with the Monorail Transportation System

SHAFTING HANGS HIGH

Located Above Roof Girders at Plant of Cincinnati Grinder Co.

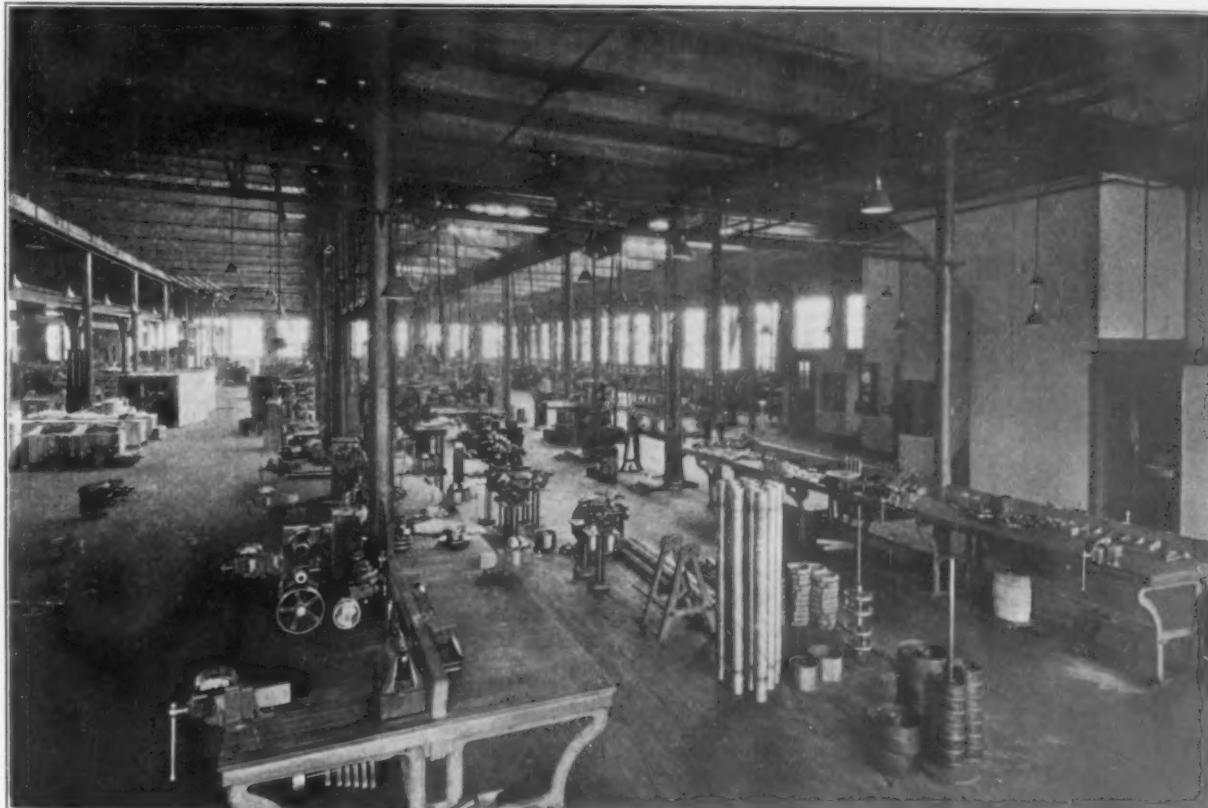
A number of simple but distinctive features are found in the arrangement of the new plant recently occupied by the Cincinnati Grinder Co. on Colerain Avenue, Cincinnati. Among these are the placing of the shafting and pulleys above the girders, the arrangement of the drafting room so that the light falls over the left shoulder, the location of the time clock at the

locker room exit and the separation of the locker and toilet rooms.

The building is of slow burning mill construction, 96 x 220 ft., and is located on a lot which slopes toward the rear. This feature was utilized to provide a basement, 96 x 100 ft., at the rear without necessitating a great amount of excavation, and at the same time natural light is secured during the day, so that it is unnecessary to employ artificial light under ordinary circumstances. A second story that extends 50 ft. over the main shop furnishes space for the office and drafting room. A sprinkler system is installed throughout the entire plant and sanitary drinking fountains at convenient locations provide a supply of cooled water.

The building is covered by a sawtooth roof and all shafting and pulleys are placed above the girders to provide a maximum amount of headroom. The group system of motor drive is employed throughout, central station power being used, and the motors are mounted above the top girders in the sawtooth roof section. In this way the monorail overhead trackage in the two easterly bays is not interfered with, and it is further pointed out that the longer drive for the individual machines has been found to be an advantage in the ease with which belts can be shifted and also in eliminating belt slippage to a large extent.

All of the castings and some of the other materials entering into the construction of the machines are delivered to the basement by an electric elevator that also serves the main floor. The castings are stored in the basement until needed, when they are taken to the main floor. Here the work travels in one general direction around shop, the last operations being performed adjacent to the elevator entrance. Benches for light work are located in the central portion of the shop near the front entrance and are without shelves or drawers, as well as being built so that no rubbish can accumulate underneath without attracting the attention of the various foremen. From the first floor the completed machines are lowered to the basement, where one section is used for painting and crating them prior to shipment. The toolroom is located in the center



The Heavy Work Progresses in One Direction around the Shop and Is Delivered to the Basement Shipping Department by an Elevator, While the Lighter Work Is Performed at the Benches in the Foreground Which Are Designed to Prevent Rubbish from Accumulating Underneath. The exit from the locker room where the workmen don their overalls before registering their time is shown at the right together with the time clock

of the main shop, and a space 6 in. high is provided under the bottom shelves in the inclosure to prevent the careless storing of tools or other supplies on the floor. The check system for giving out the tools is employed, and when a tool is returned it must be put in its proper place, as otherwise it would attract the attention of the foreman.

An emergency hospital room is fitted up on the main floor near the front entrance and adjacent to this is a locker room that is exclusively for the foreman. The locker and washroom for the workmen is located directly at the entrance of the plant, and the time clock is placed at the locker room exit. In this way the workmen pass through the locker room and all changes of clothing are made on their own time. This is a reversal of the usual arrangement, where the clock is placed at the entrance to the plant and the employer is compelled to pay for the time spent by the workmen in donning their overalls. The toilets are located separately from the locker and washroom.

STEEL BALL MANUFACTURE

Hoover Steel Ball Co. Issues Book Descriptive of the Ball Making Art

Of a most informative character is a book of 115 pages, 6 x 9 in., which the Hoover Steel Ball Co., Ann Arbor, Mich., issued early this year under the title "The Evolution of the Steel Ball Industry." A foreword to the book states that it is an endeavor "to show step by step the various stages through which a ball passes from the rough steel blank to the mirror-like finished sphere"; also that "the object of this treatise is to lay bare facts which have heretofore been generally unknown, and if we succeed in stimulating further interest in the ball industry, this work will not have been in vain." An account is given of the early manufacture of balls in the United States, then the various processes now used are described and illustrated. The opening paragraph of the historical narrative reads as follows:

"During recent years the application of ball bearings in machine design has increased rapidly, and this type of bearing is now used in many machines where plain bearings were formerly considered good enough. Until German export facilities were shut off by the war, the majority of the steel balls used in these bearings were made by the Deutsche Waffen und Munitions Fabriken of Berlin, Germany, and the product of this firm has become so celebrated that many persons think the steel ball industry was developed by the Germans. As a matter of fact, the art of ball making goes back to a very early date, and the development of original methods for doing this work is credited to the Chinese. To those who have credited the Germans with the development of commercial methods of ball manufacture, it will doubtless be of interest to learn that the first commercial steel balls were made in this country under basic patents granted to Richardson of the Waltham Emery Wheel Co., Waltham, Mass., and that the original ball-making machinery for the plant of the Deutsche Waffen und Munitions Fabriken was designed and built in the United States and shipped to Germany ready to use."

The historical chapter states that one of the first firms to manufacture steel balls on a commercial basis was the Simonds Rolling Machine Co., Fitchburg, Mass., also the Cleveland Machine Screw Co., Cleveland, Ohio. It is stated: "About 1890 the Cleveland Machine Screw Co. designed and built for the Deutsche Waffen und Munitions Fabriken of Berlin, Germany, equipment used in its original steel ball plant, and this marked a most important step in the trade, owing to the reputation for making high-grade balls that was later acquired by this firm. The machines built and shipped to Germany had no reference to American manufacturing rights, and the Cleveland Machine Screw Co. continued to operate its plant in the usual way."

Later the Cleveland Machine Screw Co. was sold to

the Pope Mfg. Co., Hartford, Conn. In 1901 the Standard Roller Bearing Co., Philadelphia, Pa., acquired all obsolete and existing plants engaged in the manufacture of steel balls. L. J. Hoover, who was formerly in the employ of the Standard Roller Bearing Co., left that firm in 1906 and formed the Grant & Hoover Co., Merchantville, N. J. The name of this firm was later changed to Atlas Ball Co., and the plant was transferred to Philadelphia, where it is still in operation. On March 1, 1913, the Hoover Steel Ball Co. of Ann Arbor, Mich., was organized by Mr. Hoover for the purpose of engaging in the manufacture of high-grade steel balls to take the place of those formerly imported from Germany. Perusal of the book is convincing of the success achieved by the company, its consumption of steel now being in excess of 500 tons a month, and its production of balls, calculated on the basis of $\frac{1}{4}$ -in. balls, being between 25,000,000 and 30,000,000 per day.

An interesting phase of the treatise is that it not only gives the names of manufacturers whose machines are used in the manufacture of balls, but also contains half-tone illustrations and line cuts showing how the machines operate. It also contains useful tables and data, and numerous illustrations of the company's shops.

New Directory of Iron, Steel and Metal Companies

The Atlas Publishing Co., 150 Lafayette Street, New York, has issued a new edition of its Standard Iron-Steel-Metal Directory. A feature of this directory which distinguishes it from similar directories is that special effort has been made to give the raw material used by blast furnaces, steel plants, rolling mills, foundries and other manufacturing concerns. The directory is especially valuable in indicating users of non-ferrous metals and all kinds of scrap. A list of scrap, iron and metal dealers of the country is given and other lists include shipbuilders, automobile manufacturers, street railway companies, railway purchasing agents and rubber reclaimers. The book is for sale at \$8, by the U. P. C. Book Co., 239 West Thirty-ninth Street, New York.

A Seventy-first Anniversary Booklet

The Greenfield Tap & Die Corporation, Greenfield, Mass., has issued a booklet, giving the historical development of the organization from 1871 to the present time. The text matter in this section of the booklet is supplemented by numerous views of men prominent in the organization at various times and some of the earlier tools produced. A well-illustrated description of the recently opened administration building is included.

The fourth edition of "Steam Tables for Condenser Work," published by the Wheeler Condenser & Engineering Co., Carteret, N. J., has just been printed. There are three tables, giving the properties of saturated steam for vacuums ranging from 29.8 in. to atmospheric pressure, for temperatures from 32 to 212 deg. Fahr., and gage pressure from 0 to 200 lb. Constants and tables for correcting vacuum column and barometer readings for the thermal expansion of mercury, the relative expansion of mercury and the brass scale and other corrections are included.

The Studebaker Corporation, South Bend, Ind., has published a history of the organization, written by the president, A. R. Erskine. This booklet covers in detail the development and organization changes of the Studebaker Corporation from its beginning up to the present time. The booklet is profusely illustrated.

"Concentration Experiments with the Silicious Red Hematite of the Birmingham District, Alabama," by Joseph T. Singewald, Jr., is the title of Bulletin 110 of the U. S. Bureau of Mines.

Large Lead Exports to Great Britain

While lead exports are not now as great as in 1915, the movement is still large. There has been also a remarkable change in the destination. The following table, compiled from Government data, gives the exports for the calendar years, 1915, 1916 and 1917 as well as the present rate as represented by the seven months ended with Jan. 31, 1918, for the last three years:

Lead Exports from the United States in Pounds

Period	From Domestic Ore	From Foreign Ore	Total	Rate per Month
1917	112,418,310	64,514,449	176,932,759	14,744,396
1916	200,999,835	19,305,109	220,304,944	18,358,745
1915	176,612,208	42,778,467	219,390,675	18,299,223
7 mos. ended Jan. n. 31,	62,997,653	58,839,873	121,837,526	17,405,360
7 mos. ended Jan. n. 31,	123,955,848	11,099,891	135,055,739	19,293,677
7 mos. ended Jan. n. 31,	75,092,133	45,251,471	120,343,604	17,191,943

This shows that the greatest export rate was, in 1916 with 18,358,745 lb. per month, last year falling quite a little below this. At present, however, the outgo is at the rate of 17,405,360 lb. per month, the January exports having been 15,222,839 lb.

The unusual feature is the large amount now actually going to Great Britain. This is indicated by the following table, giving the shipments in pounds to the United Kingdom, Canada and Russia in Europe, as compared with previous records:

	To Great Britain	To Canada	To Russia in Europe
Calendar year 1917	52,502,154	65,619,251	28,008,586
7 months ended Jan. 31, 1916	33,480,387	39,363,308	15,293,898
7 months ended Jan. 31, 1917	6,128,005	61,100,957	26,837,325
7 months ended Jan. 31, 1918	63,723,099	6,208,672	26,358,860

Great Britain is now taking over 50 per cent of the total as compared with only about one-third for all of 1917. Canada's consumption has dwindled from 61,000,000 lb. to 6,000,000 for the same seven months while Russia's proportion has changed but little. Of the January lead exports 75 per cent went to Great Britain whereas in the entire 10 months ended Oct. 31, 1917, Great Britain absorbed only 10 per cent of the total. During November, December and January exports to Great Britain have averaged 14,000,000 lb. per month. One explanation in the trade of the fact that the increase of exports to England is coincident with the falling off to Canada, is that the greater part, if not all of the British business has been met by Mexican lead refined here in bond, and that England herself is now using the metal direct which Canada formerly consumed for her.

Foundry Week in Milwaukee

The simultaneous gathering of five important associations affiliated with the metal trades is now likely to mark the week set apart for the annual conventions of foundry interests and the annual foundry exhibition scheduled for the week of Oct. 7 in Milwaukee. The fall meeting of the iron and steel section of the American Institute of Mining Engineers is then to be held and besides the conventions of American Foundrymen's Association and the American Institute of Metals and the exhibition of foundry equipment and supplies and of machine tools and accessories, two organizations of casting manufacturers have plans to schedule their October meetings in Milwaukee in the same week.

In a statement prepared by industrial interests at Centralia, Ill., descriptive of its transportation, mineral and newly discovered oil resources, a maximum of sunshine is put forward as an important factor in maintaining manufacturing output. An average of 60 per cent of sunshine locally is given as against 57 per cent at Chicago, 54 at St. Paul, 53 at New Orleans, 52 at Detroit, 49 at Buffalo and 44 at Pittsburgh.

Keeping Molding Sand from Freezing

To avoid the trouble in the winter season caused by the freezing of molding sand, such as was widely experienced last winter, a number of plants have made pro-

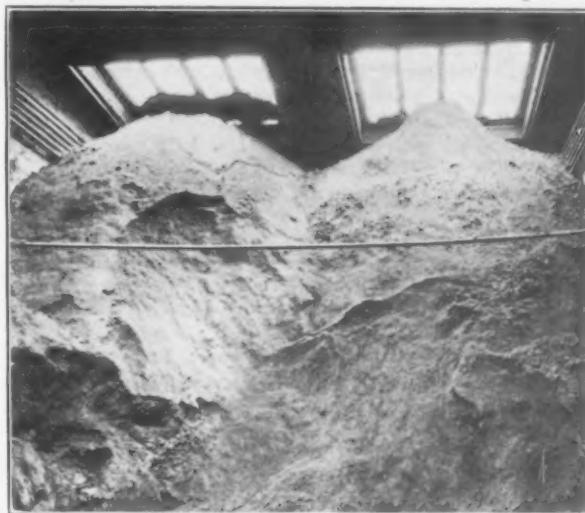


Molding Sand Is Dumped from the Buckets of the Overhead Yard Traveling Crane through Hatchways in the Roof of the Reinforced Concrete Storage Building

vision to overcome this difficulty. Among these is the Niles Tool Works Co., Hamilton, Ohio.

This company has erected an addition to its foundry for handling sand which is 20 x 30 ft. of reinforced-concrete construction. Four openings are provided on the top, and a sliding hatch covering having metal frames and wired glass tops these openings. The sand is unloaded through these hatchways and is delivered in large buckets by the overhead yard traveling cranes from the storage bins, about 50 ft. distant, or it is unloaded directly from the cars. The addition is located midway of the foundry building, close to the sand-mixing machine, which is inside the foundry proper. An electric elevator is employed for conveying the sand to the top of the machine.

The interior of this sand-storage department has two sets of steam coils, one at the top of the building and the other near the bottom, these steam lines being



Two Sets of Steam Coils on the Walls of the Sand Storage Building Are Relied upon to Keep the Temperature above the Freezing Point

connected with the heating system of the foundry. No matter how low the outside temperature fell in the past winter it is stated that no difficulty was experienced by the freezing of sand in this sand-storage room.

A syndicate in which James Playfair, foot of Manley Street, Midland, Ont., is interested proposes to establish a plate mill and make improvements to its shipbuilding plant.

PULVERIZED FUEL FOR STEEL

Economies Obtained, Temperatures and Desirable Properties of Coals

Temperatures ranging from 1900 to 3500 deg. Fahr. are possible using pulverized coal fuel, according to a paper prepared by H. R. Collins, mechanical engineer, Fuller Engineering Co., Allentown, Pa., for the Colorado meeting of the American Institute of Mining Engineers to be held in September. The highest temperature he has observed was 3500 deg. in an open-hearth furnace, the temperature of the furnace itself ranging from 3100 to 3200 deg. His experience with various grades of coal leads him to believe that any carbonaceous fuel in solid form, from lignites to the graphitic anthracites of Rhode Island, yields its maximum heat if burned in a truly pulverized condition. Such fuel, he holds, permits the maintenance of a constant temperature, his point being that when the fuel and air have once been properly set and the furnace brought to its proper temperature the established conditions will continue. Automatic control of fuel and air to maintain desired temperatures, he says, permits a minimum of excess air, he having obtained as high as 17 per cent CO₂. The following notes are from his paper.

Coals analyzing 25 per cent ash and 5 per cent sulphur give no trouble in metallurgical furnaces, kilns or boilers, the sulphur being entirely consumed by burning in suspension and none of it being absorbed by the metal or other liquid bath. For the above uses, however, coal having 35 per cent volatile matter, 50 per cent carbon, 8 per cent or less of ash and 2 per cent or less of sulphur are preferable. The finer the coal the more rapid its combustion with relatively higher efficiency. Fuels low in volatile matter, but high in fixed carbon, as anthracite and coke breeze, require a special furnace in which the incoming fuel and air pass through the flame and the products of combustion in a water-cooled arched firebrick chamber on their way to the furnace or boiler. When the volatile matter of the coal ranges from 1 to 3.5 per cent it is difficult to support combustion unless a temperature of above 900 to 1000 deg. is maintained.

It is commercially possible to grind coal so that at least 95 per cent will pass a 100-mesh sieve and 70 per cent will pass a 300-mesh sieve. The cost of pulverizing coal containing 7.5 per cent moisture will range from 30 to 40c. per ton, not including overhead charges, assuming that 200 tons are pulverized per day. Pulverized coal should be conveyed from mills to bins in as compact a condition as possible, and air currents should not be used to convey it if any other method can be devised. Carelessness in handling the fuel and poorly designed plants are the only causes for explosions.

For certain types of burners part of the air is preheated in regenerators, this preheating ranging from 100 to 600 deg. for what he terms a positive type burner and from 1300 to 2200 deg. for a single type burner in open-hearth practice. In the latter usually 10 to 15 per cent of the air enters with the fuel and 85 to 90 per cent from the regenerators. In metallurgical furnaces, experience seems to point to the need of vertical baffle walls where the waste gases enter the regenerative chambers. Turning the direction of the gases up and down several times tends to discharge the dust tangentially, allowing the major part to settle in the bottom passages, from where it is easily removed. The narrow side of the brick tile should be laid vertical and on rider walls to permit the use of longitudinal scrapers to remove the ash which may have passed by the vertical baffle wall.

The life of a furnace using pulverized fuel is equal to that of hand-fired, stoker, oil or gas-fired furnaces. Savings using pulverized fuel in the operation of various furnaces have been obtained as follows: Heating and busheling furnaces, 20 to 25 per cent; puddling furnaces, 30 to 50 per cent; open-hearth furnaces compared to gas producers, 30 to 40 per cent, and copper reverberatory, smelting ore, 30 to 45 per cent. In other furnaces the following fuel consumptions were ob-

tained: Continuous billet heating furnaces, 160 lb. of coal per ton of billets; desulphurizing iron ore in rotary kilns, 296 lb. per ton of ore; drying and nodulizing iron ore in rotary kilns on a basis of 30 per cent free moisture and 11 per cent combined moisture, 477 lb. per gross ton of ore.

American Institute of Metals Affiliated with Mining Engineers

The American Institute of Metals has accepted the invitation of the American Institute of Mining Engineers to become a part of that organization. As the result of a referendum vote, it becomes the metals division of the A. I. M. E. It will elect its own officers, raise funds for its own special work and have active control of such funds. Cash in the treasury and monies collected from the sale of back volumes of transactions are to go to these funds.

There will be two meetings a year instead of one as at present. The winter meeting will be held in February in New York and the program will consist principally of technical papers. The fall meeting will be held as now, at the same time and place as the meeting of the American Foundrymen's Association. Its program will consist of papers on practical foundry topics and will probably combine with the iron and steel section of the A. I. M. E. held at the same time.

The secretary of the A. I. M. E., and the managing editor will take over the work of editing and publishing all papers accepted for the transactions. The headquarters of the A. I. M. E. in the Engineering Societies Building at 29 West Thirty-ninth Street, New York, will be the headquarters of the Institute of Metals Division. The papers read before the Institute of Metals Division and other papers on allied subjects will be collected in a special volume of transactions. The dues of the Institute of Metals Division will be the same as for the A. I. M. E., viz.: \$12 a year.

Officers of Eastern Bar Iron Institute

The Eastern Bar Iron Institute held its annual meeting on May 7 in New York, and elected the following officers to serve in the ensuing year:

President, John C. Brown, sales manager Lebanon Valley Iron & Steel Co., Philadelphia; vice-president, O. H. Reinhart, secretary Milton Mfg. Co., Milton, Pa.; treasurer, E. T. Edwards, Columbia, Pa.; members of executive committee, E. M. Zehnder, president Scranton Bolt & Nut Co., Scranton, Pa., and R. W. Gillispie, assistant general sales agent, Bethlehem Steel Co., South Bethlehem, Pa.

A. J. Eddy has been retained as counsel, and Albert C. Taylor continues as secretary with the headquarters of the Eastern Bar Iron Institute at 103 Park Avenue, New York.

New Hospital Planned for South Works

Plans have been submitted to the Chicago building department for a four-story fireproof hospital to be erected at South Chicago for the South Works of the Illinois Steel Co. to cost \$125,000. The plans provide for a building of reinforced concrete construction, with a pressed brick and stone exterior and composition roof.

The United States District Court at St. Louis has formally enjoined striking employees of the Wagner Electric Mfg. Co. from using threats to induce employees of the company who remained at work to strike or to join the union of the strikers. All members and officers of the local union are included in the injunction. The company is manufacturing heavy shells for the Government.

It is reported that extensive wolfram deposits have been discovered in the Yamethen district of Burma, India. Molybdenite deposits have also been found in that district.

Large Steel Ingot Production in April

The American Iron and Steel Institute has compiled the statistics of steel ingot production in April which show that in that month the output of twenty-nine companies which in 1916 produced 88.14 per cent of the total of steel ingots was 3,163,410 gross tons, or an average of 121,670 for the twenty-six working days. In the twenty-six working days of March the daily average was 119,630 tons. Assuming that the twenty-nine companies reporting made 88.14 per cent of the total in April, as they did in 1916, the April output of ingots for the country would figure out at 3,589,074 tons, or roundly 43,000,000 tons a year. In the table below the ingot production for the twenty-nine companies is given by months for the past eleven months, all figures representing gross tons:

	Open Hearth	Bessemer	All Other	Total
June, 1917	2,265,772	809,552	8,605	3,083,929
July	2,152,479	777,171	9,465	2,939,115
August	2,251,013	863,873	8,331	3,123,217
September	2,195,556	770,064	6,639	2,972,258
October	2,475,754	870,494	5,687	3,351,935
November	2,384,218	772,489	9,550	3,166,257
December	2,195,832	524,084	13,806	2,733,722
January, 1918	1,763,356	429,588	10,301	2,203,845
February	1,805,233	454,457	14,051	2,273,741
March	2,331,048	763,255	16,078	3,110,381
April	2,377,974	769,249	16,187	3,163,410

The April output was practically the same as for November, 1917. Only one other month, October, exceeded it, the average for the remaining months being well below the April rate.

Decline in Steel Corporation's Orders

Unfilled orders on the books of the United States Steel Corporation on April 30 were 8,741,882 tons, a decrease of 314,524 tons from those reported for March 31. This is the largest decrease in several months and the total is the lowest since Feb. 29, 1916. On April 30, 1917, the unfilled orders were 12,183,083 tons, or the largest in the history of the corporation. The following table gives the unfilled tonnage at the close of each month since January, 1915:

	1918	1917	1916	1915
January	9,477,853	11,474,054	7,922,767	4,248,571
February	9,288,453	11,576,697	8,568,966	4,345,371
March	9,056,404	11,711,644	9,331,001	4,255,749
April	8,741,882	12,183,083	9,829,551	4,162,244
May	11,886,591	9,937,798	4,264,598	
June	11,383,287	9,640,458	4,678,196	
July	10,844,164	9,593,592	4,928,540	
August	10,407,049	9,660,357	4,908,445	
September	9,833,477	9,522,584	5,317,618	
October	9,009,675	10,015,260	6,165,452	
November	8,897,106	11,058,542	7,189,489	
December	9,381,718	11,547,286	7,806,220	

Stove Manufacturers Meet

At the meeting of the National Association of Stove Manufacturers in New York last week, ex-Governor John Franklin Fort of New Jersey, now a member of the Federal Trade Commission, made an address in which he explained in detail the operations of that board. F. C. Schwedtman, vice president of the National City Bank, New York, spoke on "Commercial Preparedness" and Jones T. Templeton, vice president of the Buck Stove & Range Co., spoke on the topic "Should Quality Be Sacrificed for Cheapness?" The following officers were elected: President, Frederick Will; vice presidents, Lee W. Van Cleave and Robert M. Leach; treasurer, Sherman S. Jewett; secretary, Roberts S. Wood.

The Bridgeport Housing Association is understood to have been assured from Washington that \$3,000,000 of the housing appropriation recently passed by Congress for housing munitions workers will be loaned for work in Bridgeport. The association is taking steps to secure the necessary local backing at once, so that work on a large scale can be begun.

Two shifts, from 6.15 a. m. to 2.15 p. m., and 2.30 p. m. to 9.30 p. m., with 45-min. intervals, is found to give good results in munition plants in France, at least where large numbers of women are employed. By the arrangement, night shifts with their attendant disadvantages are avoided.

Increasing Supply of British Steel

There seems to be some uneasiness in Great Britain as to the present condition of the steel industry. The question of an increase in maximum steel prices is evidently being agitated, but the surprising feature is the question raised as to the future demand for the much increased output of steel and iron. The large supply of high speed steel is especially a matter of comment. The following from an editorial in a recent issue of the London *Ironmonger* on "The Supply of Steel" is full of interest:

The situation in the steel trade contains some elements of disturbance, although on the whole it is not unsatisfactory. The large increase in the production of most kinds of steel has caused an unsettled feeling, which has found expression in exaggerated fears of over-production, particularly of open-hearth and crucible steel. Moreover, it is known that negotiations for an advance in maximum prices have been in progress, and in an instance which has been brought to our notice a price in excess of the maximum has been charged with a note that it is made "as arranged with the Ministry of Munitions." At the moment the position is somewhat puzzling to traders, but official announcements may be expected in a week or so which will definitely clear up the question of prices. No advance need be expected in steel billets of ordinary quality, although it is recognized that the costs of production have increased in many directions. The difficulty may perhaps be met by a subsidy. The maximum prices for certain special steels, such as one or two carbon qualities, will probably be raised, but nothing has yet been settled as to the extent of the advances.

There has been some speculation about the effect of the elimination of the Russian market upon the disposal of production. Assertions are made that the industry is faced with over-production and that the works will soon be able to place extensive tonnages at the disposal of the trade. There is, however, little likelihood of such a state of things coming about. At present, no doubt, stocks of steel are accumulating at the works, but it is difficult to say exactly how much of this is due to the insufficiency of railroad facilities and how much to excess of production. Those in a position to gage future national requirements, however, are of the opinion that very little steel will be available for civil use at home and for export.

The remarkable boom in tool steel which has been in existence since the beginning of the war also appears to have spent itself. Makers of high-speed steel who have been accustomed to receive far more orders than they could execute are now well abreast of the demand and able to deliver as promptly as the conditions at the mills will permit, while others report that the booking of new orders is not keeping pace with the production. This comparative quietude is accentuated by the return to Sheffield from various seaports of large quantities of high-speed steel which had been purchased for shipment to Russia. That important market does not count at present; France and Italy are extending their home manufacture of tool steel and consequently require less from Sheffield; there is a heavy drop in the consumption of the shell shops, and the export trade has been cut down to a negligible quantity by government interference.

On the other hand, the marine engineering shops and the dockyards will need huge quantities of tool steel and engineers' tools, and the consumption of aircraft, tanks and automobiles is considerable and likely to increase. Aircraft construction will probably absorb most of the output of the electric furnaces. What the situation calls for is an effort to recover some portion of the lost trade with America, Japan, India, the Colonies and Scandinavia, but that would entail a drastic change of policy on the part of the Ministry of Munitions and the War Trade Department.

The Perkasie Forge Co., Perkasie, Pa., whose plant was destroyed by fire, will construct a new plant at Sellersville, Pa.

Uses of Zirconia in Steel Metallurgy

Its Occurrence and Preparation—Value and Properties as a Refractory—Zirconia Brick—Ferrozirconium in Steel Making

THE possibility that zirconium, both as a refractory and as an alloy in steel, may assume an important role in steel manufacture and metallurgy is being recognized. Some items have been published as to German steel containing zirconium, and also as to experiments with zirconia as a refractory. It is known also that the United States Government has already taken steps to investigate the material in all its phases.

A paper on "Zirconia, Its Possibilities in Metallurgy," was recently read before the Birmingham Metallurgical Society (British) by Leopold Bradford, an abstract and brief discussion of which follows:

Zirconia-bearing minerals are fairly widely distributed, being found in Ceylon, North and South America, the Urals, Norway and Australia, and, in a smaller degree, in the monazite sands of India. They exist in various forms, and are variously known by several names, but Baddelelite and Zirkite, both of which are found in great abundance in Brazil, are of the most industrial importance.

The Ores and Their Analysis

Baddelelite has a zirconium-oxide content varying from 74 to 92 per cent, and usually occurs in the form of stony fragments, pebbles and blackish glassy masses. Zirkite yields from 72 to 95 per cent of zirconia. The deposits consist largely of pebbles and rocky masses. It exists in fibrons of columnar formation, while baddelelite was more or less crystalline.

The characteristics of baddelelite and zirkite are: High degree of infusibility, high resistance to acid and basic slags, low thermal conductivity and low coefficient of expansion. Two analyses of baddelelite are as follows:

	Per Cent	Per Cent
Zirconia	82.00	86.51
Silica	11.38	2.50
Titania	0.36	1.43
Alumina	0.62	1.00
Ferric oxide	2.08	5.29
Loss (by calcination)	3.33	3.32

Zirconia is a white powder when pure; it is a non-conductor of electricity unless heated to a high temperature, and, strongly ignited, is very stable to acids and alkalies.

Its Preparation as Crucibles

In the production of refractory articles, such as crucibles, zirconia is fused in a modified type of arc furnace at 50 amps., 220 volts, and afterwards ground in a steel ball mill. The powder is then molded or pressed into the required shape with or without an organic bond (as starch), for by grinding a portion to 200 mesh it becomes colloidal in the presence of water, and in that state can be used as a plastic cement for binding the bulk. After gradually drying, the articles are burned, at 2300-2400 deg. C., till contraction ceases, in a cylindrical oven of the injector type, the fuel being either town gas, petroleum, or acetylene supplied with a blast of air and finally with one of oxygen. The crucibles should give a clear ring when tapped, and have as fine a texture as porcelain. Fused zirconia has a high thermal endurance, is not affected when heated to redness and plunged into cold water, its coefficient of expansion being extremely low—0.00000084. Its resistance to crushing strains is many times greater than that of quartz glass. Its hardness is between that of corundum and quartz; its specific gravity 5.89, and porosity below 1 per cent. The melting-point is 2950 deg. C., but 0.5 per cent impurity reduces that by 100 deg. C. In a crucible of fused zirconia, platinum (m.p. about 1753 deg. C.) can be melted to a mobile liquid. It is also claimed that crucibles made from ZrO_2 mixed

preferably with 1 per cent starch and 3 per cent magnesia, and fired first at 1450 deg. C and then at 2200 deg. C. in a vacuum electric furnace, have been successfully used in determining the boiling point of pure iron and for forming tungsten alloys.

Its Separation from the Mineral

The separation of zirconia in a relatively pure state from the native oxide can be effected in various chemical ways. Mr. Bradford suggested the following method as a possible commercial proposition:

Fusion of the finely powdered ore with nitre cake (low in iron).

Leaching of the mass and separation of the silica by filtering through asbestos mat or other suitable medium.

Precipitation of zirconia by commercial sodium thiosulphate after nearly neutralizing the solution with sodic carbonate and precipitating at the boiling-point.

Filtration of the precipitate, thoroughly washing in a small filter press to remove the solution containing practically all the iron salts.

Ignition of the pre-dried cakes in fireclay pots.

By that method, which could readily be carried out in a works making nitric acid, an oxide could be produced which would contain only titania and a little alumina, which for most purposes would be harmless, and a trace of iron.

Refractory Bricks of Zirconia

Zirconia seems to be specially suitable for the manufacture of refractory bricks. The cost of such bricks can be reduced by using a body of less refractory material, as bauxite or fireclay, and facing with an outer coating of zirconia. Active tests on an open-hearth furnace using a zirconia-lined hearth have shown that after four months' continuous working the hearth was still in good condition, and capable of serving another four months, and that, as compared with the firebrick lining which it replaced, a saving of 50 per cent in maintenance costs had been effected.

Zirconia is liable to reduction at high temperatures, forming carbides. Such carbides can be used for making cutting and grinding wheels.

The Metal and Its Alloys

Mr. Bradford outlined several processes for the preparation of the metal zirconium, pointing out that it had been obtained in the amorphous, graphitoidal and crystalline states. Wedekind has obtained a metal of 99.8 per cent purity, resembling white cast iron in appearance, hardness (Mohs) 7.8, specific gravity, 6.40; specific heat, 0.0804; heat of combination, 1958 calories; and melting point, 1530 deg. C. Analyses of zirconium show that it combines with avidity with certain non-metallic elements, especially oxygen and nitrogen.

Numerous alloys of zirconium have been prepared. One containing 60-90 per cent zirconium, the rest being mainly iron, are said to be substantially free from metalloids and oxides, and malleable and ductile. A self-hardening alloy for cutting tools consists mainly of nickel, or nickel and cobalt, together with 2 to 40 per cent zirconium and chromium not exceeding 35 per cent. Alloys of aluminum with up to 5 per cent zirconium have physical properties somewhat similar to those of aluminum-titanium, but the tensile strength is rather lower and the elongation correspondingly higher.

Steel Purification by Ferrozirconium

Ferrozirconium prepared by reducing zirconia with aluminum powder by the Goldschmidt process can be easily produced, and would doubtless prove important. It can be made to contain up to 35 per cent zirconium, and has been used to some extent to replace ferro-

titanium in the purification of steels. The addition of small quantities of that alloy to steel, brass and copper are said to secure sound castings and to increase tensile strength and resistance to acids. Its action is probably that of a scavenger. An alloy of zirconium 65 per cent, iron 26 per cent, aluminum 7.7 per cent, and titanium 0.12 per cent, is said to be highly resistant to acids and not subject to oxidation. A 20 per cent ferro-zirconium alloy has been added to steel in the proportion of 0.1 per cent of the steel treated for scavenging purposes. Ferrozirconium has been used in Germany for the production of an extremely hard steel for armor plates, armor-piercing projectiles and bullet-proof sheets.

Discussion

F. C. A. H. Lantsberry said that undoubtedly zirconia had an advantage over magnesia not only on account of its higher melting point, but also because it was not volatile at high temperatures. The fact that zirconia is apt to shrink at high temperatures while it has a low coefficient of expansion suggests that it undergoes a change at some definite temperature. It would be interesting to discover that temperature. The tendency of the oxide to form carbides at high temperatures and consequently to increase in refractoriness has been turned to use in the manufacture of refractory bricks.

H. E. Coley intimated that processes were in operation in Great Britain for producing pure zirconium oxide on a commercial basis, and suggested that all working in that field should co-operate to avoid overlapping. The production of zirconium alloys by means of the electric furnace was almost uncommercial and the thermit process left traces of aluminum; but satisfactory alloys were being produced by other methods which would prove of advantage both to metallurgy and to the enameling trade.

Mr. Bradford, in reply to a question respecting the physical condition of zirconium in high-speed steels, said the constitution of the metal in such alloys is not exactly known, although it is assumed that it forms a solid solution. He said one of the chief difficulties in preparing pure zirconia arises from its similarity to the oxide of titanium.

Importance Industrially of Sound Teeth

Sound teeth, insured by periodic examination and prophylaxis, are emphasized by Alfred A. Crocker of the Samuel A. Crocker Co., Conrad Building, Cincinnati, as an industrial asset. The exceptional care taken by the Government in this respect of all enlisted men is cited as pointing the way out to industrial managers who seek the maximum of health and energy of workers. He points out that:

"Industrial dentistry is a feature of welfare work which corporations have with a few exceptions so far entirely overlooked, but it is hoped they will soon realize the value it has for maintaining efficiency and good health among the operatives. Many forms of welfare work have been undertaken by corporations, including hospital medical rooms, rest rooms, reading and recreation parlors, roof gardens, billiard halls, summer outing, baseball, most everything but dentistry; this with a few exceptions, for now there are a number of corporations which are carrying on this so-called 'zero' system of preventive dentistry with great success."

March Imports and Exports of Ferromanganese

Ferromanganese imports in March were 3555 gross tons as compared with 1050 tons in January and 1417 tons in February. The March imports are the largest since June, 1917, when they were 3814 tons. For the nine months ended March 31, 1918, the imports have been 20,807 tons as compared with 61,059 tons in this same period a year ago. The March imports this year were received as follows: 1370 tons through the port of Baltimore, 1184 tons through Philadelphia, 422 tons through New York, 376 tons through Norfolk and 203 tons through New Orleans.

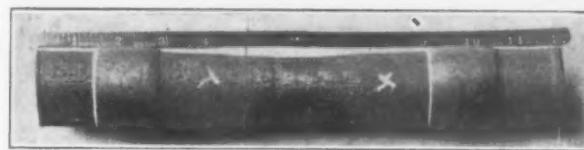
Exports of ferromanganese in March are 101 tons, bringing the total for the nine months ended March 31, 1918, to 3624 tons.

Rolling Machine for Hollow Axles

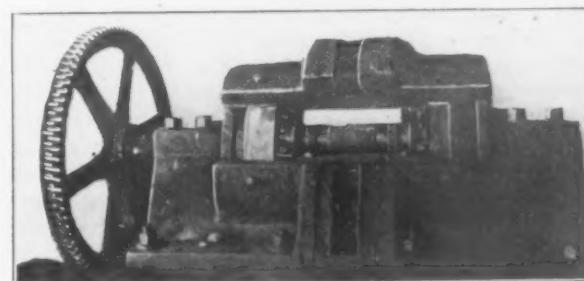
A patent covering what may be termed a machine of the concave and roll type for shaping iron and steel has been granted to David A. Clark, 914 Fidelity Building, Baltimore. The inventor has particularly in mind the application of the idea to the rolling of axles from sections of hollow tubing or pierced billets.

A model of the machine has been built. It consists mainly of a housing surrounding a horizontal roll, a space between being provided for the material to be formed. The rough cylinder to be formed is fed in at the top and by the rotation of the roll is rolled around upon its axis through the space between the roll and the inner surface of the housing, which is a die made up of a number of segmental sections formed to produce the desired shape of finished bar.

The roll is mounted in bearings in the end walls of the casing and in turn carries the work supporting rollers which come in contact with the work and are



An Ordinary Piece of Hollow Tubing or a Pierced Billet Is Transformed Into the Axe Shown by Rolling Around a Set of Rollers Shaped to Give the Desired Form



shaped like the inner surface of the housing. Gearing is provided to give these work supporting rollers a rotation in the same direction as the large central roll and a speed of rotation susceptible of change. This arrangement is relied on to eliminate slipping or dragging in the rolling process. The smaller rollers are spaced to permit scale to be discharged from the machine without interfering with the operation. Provision is also made for adjusting the work supporting rollers in a circumferential direction, thus enabling larger or smaller rods to be taken care of within ordinary limits without removing or substituting any part or making any changes other than slight shifting of the rollers toward or away from each other.

Tin Smelting in Chile

According to cable advices received by the Bureau of Foreign and Domestic Commerce from U. S. Commercial Attaché William A. Montavon, at Santiago, Chile, the Llallagua tin smelter, recently erected at Arica, Chile, is now working on a small scale, its total production to date being 30 tons of metal of 99.8 per cent purity and free from arsenic and antimony. The smelter comprises one reverberatory, one liquating, and one roasting furnace, with a monthly capacity of 1000 tons of barilla, producing approximately 650 tons of metal. California petroleum residuum is used for fuel. An additional reverberatory and an additional roasting furnace are now under construction, which will increase the capacity of the plant to 1500 tons of barilla in about two months, at which time the present Llallagua contract will have expired.

The name of the Standard Fuel Appliance Co., Detroit, builder of industrial furnaces, has been changed to the Standard Fuel Engineering Co.

Economic Factors in the Iron Industry*

Agricultural Machinery and Eastern Developments Succeeding the Railroad-Building Era—The Coming in of Coke, Mesaba Ore and Steel

BY DR. MALCOLM KEIR

AS we have stated, the principal market for iron before 1860 had been in the East, for it was there that railroads were first built, where factories prospered and where the bulk of the population dwelt. After the war, railroads pushed on beyond the Mississippi and became transcontinental in scope. The Middle West was filled with feeding and connecting lines within its territory. In Ohio, Indiana, Illinois, Iowa and Missouri, railroad after railroad was constructed until this area had the densest railway net in the whole country.

Demand for Agricultural Machinery

To supply the materials for the construction and equipment of the railroads expanding with such amazing rapidity staggered the already burdened iron industry. The influence of the railroads upon iron production, however, was by no means limited to the necessities of the roads themselves.

Railroads made it possible to market grain raised in the territory beyond the Mississippi, but it was impossible to plant, cultivate and harvest great wheat, corn, oats and rye crops without the aid of machinery. Hence railroads indirectly stimulated the manufacture of labor-saving mechanism for use on farms, and each new device led to the adoption of another. For example, after 1855 reapers were sold as fast as they could be manufactured, but improved reapers permitted the harvesting of larger areas, hence the necessity arose for more rapid threshing and cleaning machines. When these were obtained, seeders and cultivators were a necessary sequence, and so the chase went merrily onward, one mechanism inducing another. In 1830, 34 agricultural machines were patented; in 1831 the number was 38, but in 1861 no less than 350 patents were issued and in 1863 the number had advanced to 502. Machines took the place of war-drafted men.

Now, all this agricultural machinery meant a demand for iron and ever more iron; furthermore, each great farm using reapers, binders and the like at the same time increased the existing demand for the simpler tools of farming, such as hand-rakes, hoes or shovels. Farmers and even cattlemen, too, soon discovered that they must set limits upon the hitherto boundless prairies or plains, so where wood was scarce, wire fences were run along boundary lines to set pastures off from fields, and to separate one man's holdings from his neighbors. To satisfy the desire for wire fencing alone would have made a comfortable addition to the production of iron furnaces, but in many other ways, too, did the growth in number or size of farms reflect itself in the iron industry. New wagons required iron, horse shoes were iron, roofing was often of iron, pails, nails, hinges, locks, latches, and countless other articles could be traced to an origin in a

*Fifth part of a historical analysis of the progressive establishment of iron industry centers from and finally back again to the Atlantic Coast. The author is assistant professor of industry at the University of Pennsylvania, Philadelphia.

¹The air in anthracite furnaces was under a pressure of 7 to 10 lb. The Lucy furnace of Pittsburgh using coke in 1870, had a draft pressure of 8 to 9 lb., but whereas the anthracite furnaces were 55 ft. high and produced 200 to 300 tons a week, the Lucy furnace was 75 ft. high and turned out 600 tons a week.

blast furnace. Consequently railroads added enormously to the market for iron, not only for their own equipment but also for the equipment of the farms the railroads served.

Reflex Action on Eastern Demand

Even this does not tell the whole story, for nearly everything that a farmer in Kansas bought from the East, whether the article itself were iron or not, increased the sale of iron in the East. A call for more clothes in the West was translated into a demand for more factories and more machinery in the East, both factories and machines requiring iron for their construction. The railroads, therefore, created a direct enormous new market and at the same time stimulated indirectly another market almost as great. Every house that was built, every town that became a city, every waterwheel that turned, every steam engine that labored, every book that was written or read, every meal that was prepared, nearly every activity of every man sooner or later was dependent on iron. If the modern world would be deprived of iron suddenly, our whole civilization would crash about our ears into a heap of dust. The only greater calamity than the sudden loss of iron that could occur to man would be to have the world itself crumble away and vanish.

With such a market the iron industry strained under the pressure put upon it and sought to adjust itself to the fast-increasing needs. Greater output was the immediate, prime necessity and under this lash startling advances were made in mechanisms. Furnaces that were 45 ft. high in 1859 were replaced by 75-ft. stacks in 1872; whereat the world stood agape; but even these were not adequate, for by the time the century closed furnaces 110 ft. high had been erected. The 35 tons a day output of 1860 was pushed to 50 tons ten years later. Within five years this figure was doubled and another five years saw it doubled again. By 1890 the daily output was 300 tons, and since the opening of the twentieth century the astounding amount of 700 tons a day has been reached! Put this figure alongside the 8 tons a week of the Lynn furnace in 1645 or even the 35 tons a week that was usual in 1825.

What Brought Coke Into Use

The larger furnaces magnified the difficulties inherent in anthracite as a fuel; its wastefulness of draft;¹ its crushing or matting under heavy loads of ore, thus limiting the height of furnaces; its comparatively high percentage of non-combustible, non-heating elements, its lack of uniformity, and its increasing price. A careful search was instituted for a more ideal fuel, and after investigation, experiment and failure, at last success was attained with coke, a substance that had been known in England since 1740, at which time English charcoal was almost exhausted, but whose adoption in United States had been long delayed by the ample supply of charcoal or anthracite. Even in 1849 there was not one coke oven operating in all Pennsylvania, and seven years later the State claimed but 21.

The best coke, the standard for the whole world, comes from a seam of coal found at Connellsville, Pa., about 50 miles southeast of Pittsburgh. This coke runs as high as 70 per cent fixed carbon and has less than one per cent of sulphur, or phosphorus. The first commercial development of Connellsville coke began in 1841, when it was sold in Cincinnati to stove manufacturers and other iron refiners, but coke of any kind was not popular; as late as 1855 there were not a hundred coke ovens in the United States. In that year the Baltimore & Ohio Railroad was completed to Pittsburgh and carried coke to that city, where it was used successfully in the rolling mills.

The real development of Connellsville coke, however, did not begin until 1860, when it was used for smelting iron. With the adoption of Connellsville coke, the fuel problem for the increasingly large blast furnaces was solved, for Connellsville coke burns easily, is strong enough to bear the burden of ore, has a high percentage of fixed carbon, and adds no impurities of its own to the iron. From 1860 onward, coke began to displace anthracite, and by 1875 had taken the lead as an iron-smelting fuel, a position it has held from that time to this.

Larger furnaces and better fuel called for a greater amount of high-grade ore than was being worked when the expansion of the market began. The ores near the existing blast furnaces were either largely exhausted or of low grade. The most satisfactory ores obtained were discovered near Lake Superior in the states of Wisconsin and Minnesota. A blast furnace in Mercer County, Pennsylvania, imported 70 tons of this ore via Erie, Pa., in 1853 and the excellence of the ore attracted the attention of ironmasters all over the State. The Sault Canal was opened in 1855 and regular shipments of Superior ore began the next year.

Ore Handling Advance in a Century

Aside from its high quality, the new ore commended itself to iron makers because it was so easy to mine. It lies near the surface and is so soft that it can be lifted by steam shovels, a fact which means that enormous quantities could be removed at small labor cost. One shovel on the Mesaba range has mined and loaded in ten hours 5800 tons; in a month the record was 164,000 tons; these results were attained by the labor of eight men. In 1900 three machines working during the day shift lifted into cars 915,000 tons of ore. On the Mesaba range these machines take five tons at each grab and five grabs fill a car in 2½ min.; in a hour they move 600 tons; on Massachusetts ponds a century earlier one man in a boat working with oyster tongs was fortunate to collect 2 tons of ore for a full day's labor. Two tons a day against 600 tons an hour gives a measure of the difference between the market for iron in 1800 and that of a hundred years later, for the amount of ore mined by modern methods in one hour would have lasted a colonial furnace for a whole year. More dirt has been removed in laying bare the Lake Superior deposits than was dug to make the Panama Canal.

The quantitative mining of the high-grade Lake Superior ore and the shift from anthracite to coke that accompanied the increased size of furnaces could not well avoid bringing about a change in the localization of the industry since the new ore and new fuel were not found near the established furnaces. Hence the greater furnaces that arose to utilize the new materials were set up in new centers more strategically located. The place that was most

admirably adapted to reap all the advantages of the changed conditions was Pittsburgh.

Pittsburgh lay halfway between the extremes of the eastern and western markets; it had excellent rail connections eastward and both rail and water routes to the West and South. After 1860 the principal railroad construction was in the states immediately west of Pittsburgh, so Pittsburgh was nearer to the point of consumption than the older centers to the east. Moreover, Pittsburgh was next door to the best coke in the world; Lake Superior ore could reach it easily and cheaply, and lastly it had a long-established rolling-mill industry—in 1856 there were 25 rolling mills in Pittsburgh and Allegheny—and was organized to market iron products. No other place possessed such a combination of attractions, so Pittsburgh became the hearth of the nation, and from 1859² onward no American community has been so thoroughly identified with all parts of the iron industry as the city that stands at the head of the Ohio River.

Pittsburgh was brought into the ranks of pig-iron producers by technical progress necessitated by an enlarged market. The same force, namely, the insistent demands of an ever-exacting market, that had put this new center into the forefront of the industry, unceasingly clamored for more and better iron. At first the cry had been for *more* iron, but as engines became larger and complicated, as trains were longer and heavier, as buildings were higher and machinery more important, the wail was for *better* iron as well as more of it. Bridges formerly of wood were constructed of iron and the known grades of iron were too weak to withstand the loads the bridges were forced to carry; likewise iron rails spread under the pound and thrust of heavier, faster locomotives and the weight of larger cars. In other fields, too, progress was manifesting itself in a demand for better iron; for example, increased business called for higher buildings in cities, but stone and brick structures cannot tower in the air without making the lower stories almost solid in order to sustain the weight of those above. This, of course, is impractical because the street floors of most buildings are the most valuable. Iron supports for stone and brick were of slight value because they buckled. So here, too, the prayer was raised for stronger iron. Railroads, factories, cities, everywhere the cry arose for better iron.

Steel was as well known to iron makers as iron itself, and had been manufactured in small quantities since the dawn of history. It could be used, however, only for the finest and most costly articles, such as high-grade cutlery, because it was so expensive to manufacture. The purest charcoal fuel and selected ore were necessary. The world needed abundant cheap steel. How to get it was the problem. The riddle was solved in England by Sir Henry Bessemer. His process gave the world what it wanted; steel made in thirty minutes, not three months; steel little more expensive than iron; steel many times stronger than iron. Its popularity was great and its application rapidly extended until steel supplanted iron for most of the important uses. The age of steel in American industry was not one that sprawled and crawled before it strode with full vigor, but like Minerva from the forehead of Jupiter, it sprang full-blown into being.

Before many years in the use of Bessemer steel had gone by, progress in the market for steel caused Bessemer steel to be as severely criticized as iron had been in 1855. By 1897 railroads and structural engineers insisted on open-hearth steel, which had been manufactured as early as Bessemer steel.

(To be concluded)

²The first furnace in Pittsburgh was erected in 1792 but was abandoned two years later on account of lack of ore. No other furnace appeared in Pittsburgh until 1859.

FOREMAN AS SAFETY ENGINEER

His Attitude an Example to Workers—Unsafe Shop Practices—The New Man

BY H. P. HEYNE*

FOREMEN are sometimes not as enthusiastic in the safety movement as might be expected; that is, they have not availed themselves of the opportunity to secure a better accident rating through familiarizing themselves with methods which have aided others in the reduction of accidents. Men of this type lack "safety education." One medium through which they may be reached and finally made to realize what safety is and how it concerns them is to issue bulletins or instructions which describe the function foremen have to perform in safety work.

Superintendents and foremen should realize that their influence upon workmen can be materially increased by carrying on a strong safety campaign. The most valuable asset of a plant is an efficient, right-spirited, responsible organization. To accomplish the desired results it requires more than good intentions, rather the hardest kind of continuous work, the basis of which is fellowship. The successful foreman is the one who is as prompt to command as he is quick to criticize.

The time is coming when workmen will refuse to work with careless fellows, and the foreman should teach his men the safe and right way to do the work, thereby to convert the careless and reckless men into careful workers. It is a paying proposition. Every time a man is injured so that he has to give up his duties, and is replaced temporarily by a new man, it means a disorganization of the force until the new man has become broken in.

Follow-Up Series of Safety Bulletins

Interesting bulletins on this subject have been issued from time to time by the National Safety Council. They cover the situation pretty thoroughly and are captioned "It's Up to the Foreman," "Rawhiding Your Men," "The Sub-Foreman," "Foremen Should Lead in Safety Work," "Foremen Can Keep the Men Interested in Safety," etc.

The foremen can be brought around very nicely by attaching to the bulletins a circular letter listing the names of all department heads, with instructions that they read the papers, subscribe their signatures in the places provided, and forward them to the man whose name appears next on the list, the last man returning the copy to the issuing office for filing.

To keep consistently at it, to hammer home "safety first," will make the movement successful, and in due time the I-don't-care foreman will be converted into an ardent accident preventionist, for the signatures testify that he has read the bulletins and this knocks out any argument in case he tries to shirk or say he "didn't know." It also insures that he has read these bulletins, which otherwise he would probably not have done.

Safety work is a humanitarian job. It brings the men together by a common bond and promotes the cooperative spirit whereby all will have a better understanding toward each other.

The violation of a safety rule should be considered in the same light as an infraction of any other rule, and the administering of disciplinary measures should be enforced for the infraction of any safety rule or regulation, so that it will be a lesson to the other men.

In the event of employing new men or making transfers from one position to another, the foreman should fully explain all dangers in connection with the work to which the men are assigned. One of the more responsible workmen should be delegated to look after the new man. This responsibility in itself will make the experienced workman more careful himself. By explaining the dangers to the men, making periodical visits, warning them of any possible carelessness and

the elimination of unsafe practices, the foreman will soon have the men with him, for he has shown an interest in them.

Reporting Slight Injuries

Immediate and proper attention to slight injuries will perhaps mean the saving of a life or limb. Its neglect is liable to develop into blood poisoning and may result in death. Slight injuries, therefore, should be given as much consideration as those of a more serious nature by making sure that the men report to the mill hospital for treatment. He may keep them on the working force and not in the "hospital squad."

Every new man on the job to replace an injured man means a decrease in production and an increase in the foreman's accident record. This can be prevented by the foreman displaying an earnestness in the work and by encouraging the men along safety lines. It will have a good effect on them and result in a reduction of accidents.

Dangerous Practices

The foreman should see to it that the wearing of gauntlets is discouraged as far as possible, especially among men working around moving or revolving machinery, as accidents have occurred through the gloves becoming caught in the machinery. Gloves of this type are as dangerous as the wearing of aprons, flowing ties, loose clothing, etc. The wearing of safe clothing, such as gloves without the long wrist extension, and overalls instead of aprons and loose clothing, should be made a shop custom.

The subject of unsafe practices could be enlarged upon, as every plant has its own problems to solve. Some establishments as a precautionary measure will not employ men who possess a luxuriant beard to work on machinery requiring close observation until after they have had the growth removed, as serious accidents have been recorded through beards being caught in machinery. No doubt there are in establishments throughout the country any number of seemingly strange requirements—adopted, nevertheless, for the benefit of all concerned.

Special Inspections

Weekly inspections should be made of the following plant details:

Tracks: Condition of roadbed, rails, etc., warning signs, clearances along tracks, walks at trestles, switches, telltales.

Locomotives: Lights, whistles, sand equipment, valves, couplers, brakes, grab irons.

Elevators: Gates, counter-weights, shafting, belts, drums, levers, shifters, cage, cables, stops.

Shop: Pinch bars, blocks, chain falls, sledges, hammers, chisels, punches.

Cranes: Footwalks, motors, wiring, tracks, bumpers, brakes, wheels, bells, drums, cables, hooks, flanges.

Through special inspection a great deal can be accomplished, as the men will soon realize that it is necessary to work with safe tools and equipment. Through these inspections defects will be discovered which might otherwise not have been brought to light until after an accident had occurred. By making prompt repairs, as noted in the inspection reports, one step farther will be taken in accident prevention.

The New Man on the Job

Records show that more than 80 per cent of the "time lost" accidents happen to employees who were in the service of the United Alloy Steel Corporation for a period of less than a year, and injuries were caused mostly through carelessness on the part of the injured or a fellow employee.

There are instances of plants where a larger force of inexperienced labor has been employed. In such cases the foremen and those who had supervision had to exercise greater vigilance in keeping accidents down to a minimum.

It is imperative that the men give more thought for the other fellow's safety than is usually the case. The

*Safety inspector, United Alloy Steel Corporation, Canton, Ohio.

older employees should assist the new man as much as possible, as they were at one time new themselves. The men must keep their eyes on their work and think properly. The mind is more easily injured by the rust of inactivity than by the wear of activity.

ELECTRIC MELTING OF BRASS

Different Furnace Types in Use—Present Status and Prospects

"The Present Status of the Electric Brass Furnace" was the subject of a paper presented by H. M. St. John, research engineer Commonwealth Edison Co., Chicago, before the Ohio Electric Light Association, New Business Co-operations Committee, at a meeting held May 8, at the Electrical League Club Rooms, Hotel Statler, Cleveland. The paper brought out the fact that the war time conditions have resulted in a considerable increase in the use of the electric furnace for melting brass, and there is some uncertainty as to whether all the furnaces now running will continue in operation when conditions again become normal.

In 1914 the metal loss in melting brass and bronze was estimated at \$3,000,000. Since that time there has been a large increase in the amount of copper alloys melted in the electric furnaces, but without this increase the loss would be nearly double at present owing to the increased value of the metal. The speaker stated that this waste is receiving in an increasing degree the attention of metallurgists, and most of the electric furnace development in the copper alloy field has been to eliminate this waste. Important advances have been made since 1914 and the present outlook warrants a considerable degree of satisfaction.

Different Types of Furnaces

Two widely different kinds of electric furnaces are now on the market and in commercial use for melting yellow brass, one highly efficient but limited in its use to a portion of the field only, and the other less efficient but otherwise more widely applicable. At least one other type of furnace has been experimented with successfully, and it is reported to be about to enter the commercial field. Two or three additional types are being developed and give some promise of eventual success. As far as yellow brass is concerned, an entirely satisfactory furnace has not been produced, but the field has been partially covered and progress is being made.

Previous to the war the use of electric furnaces for melting copper alloys did not seem feasible except where a large metal saving helped to offset the higher cost of the electricity used as compared with the fuel fired furnace. Under present conditions the high cost and poor quality of crucibles, the high cost and shortage of metal, the scarcity of labor and demand for a high rate of production are factors which combine to make electric melting profitable in many cases where it would previously have been unprofitable. Whether the electric furnace installations which owe their existence to these peculiar conditions will continue to show a profit when normal conditions are restored is an open question. Much will depend on progress in furnace design and in operation methods.

Advantage of Electric Melting

The speaker said that the electric furnace cannot be profitably employed in the brass melting industry unless there is some substantial saving to offset the increased cost of power. The principal advantage that the electric furnace is required to show is the saving of metal in melting copper alloys, and particularly yellow brass. War conditions have accentuated certain other advantages of electric furnaces, but in more normal times no electric furnace can hope to succeed unless its use results in a saving of metal as compared with a fuel fired furnace.

Besides the saving in metal, the advantages of the electric furnace in brass melting were enumerated as follows: Improved quality; exact temperature control,

insuring the production of castings with the least number of defectives; increased production; elimination of crucible cost; large operating units, resulting in economies due to increased production for the same floor space and decreased overhead charges and better working conditions, increasing the efficiency of the workmen. It is stated that in most cases a more uniform quality of metal has been produced in the electric furnaces, and that it is easier to produce an alloy of closer specified composition in an electric furnace than in a fuel fired furnace.

Taking up the different types of furnaces, the speaker stated that a great variety of electric furnaces have been tried. Some have been abandoned and some that have proved partially successful have greater possibilities. The most obvious method of reaching the high thermal efficiency without overheating the alloy is to generate heat in the metal itself by the passage of the electrical current through it. This is done by the direct resistance furnace in which the electrical contact with the metal is through electrodes, or by means of an induction furnace.

Direct and Indirect Arc Furnace

The application of the direct arc furnace to copper alloy melting has been rather limited, no new types being developed for this work. No form of the general type has ever been satisfactory in melting yellow brass or other copper alloys containing an appreciable percentage of zinc. The indirect arc furnace is somewhat more complicated, and its thermal efficiency is not so high as the direct arc furnace, but in the melting of copper alloys it can be used in larger units and seems more satisfactory. Reference was made to a new type of indirect arc furnace in which the metal as soon as it becomes molten, is agitated by the rocking of the furnace mechanically in order to avoid the overheating of the surface layer. It is stated that in this type the non-uniformity of heating is largely rectified, and alloys high in zinc can be melted without excessive loss. This type, which will soon be placed on the market, gives considerable promise of success, and should be applicable to a wide field of alloy melting.

Present Status and Prospects

Referring particularly to the present status of the electric furnace for melting non-ferrous metals, Mr. St. John said there are four types of furnaces in commercial use for melting copper alloys, and of these only two are suitable for use in alloys high in zinc. One, the vertical ring induction furnace is of high efficiency, but somewhat limited as to its application and not sufficiently flexible for general foundry use, but gives very satisfactory results within its limited range. The indirect resistance, indirect radiation furnace is less efficient and has a lower rate of production in proportion to its holding capacity, but it is more flexible and better suited for general foundry use. However, neither of these types can be classed as entirely satisfactory. The indirect arc furnace is in use for melting alloys containing no zinc, or a very small percentage of zinc. This is more efficient than the indirect resistance furnace, and within its field more flexible than the induction furnace. The direct arc furnace is being used to a limited extent for melting copper alloys which contain no zinc. Present conditions make it profitable in some cases, but its continued application is not insured.

The more promising possibilities not yet in commercial use include a form of induction furnace which will be not only efficient, but also flexible and capable of a wide-spread application, and a form of arc furnace which will be applicable to yellow brass and other high zinc alloys as well as to the less sensitive of these alloys. Efforts are being made to reach both of these goals.

The Electric Hoist Manufacturers' Association has elected the following officers for the ensuing year: F. W. Hall, Sprague Electric Works, General Electric Co., New York, chairman; C. W. Beaver, Yale & Towne Mfg. Co., New York, vice-chairman; R. T. Turner of the Shepherd Electric Crane & Hoist Co.'s New York office, secretary and treasurer.

Electric Furnace for Steel Castings

British Manipulation of a Heroult Unit with a Dolomite Bottom—Proper and Improper Charging—Comparison with Other Processes

BRITISH practice in manipulating the Heroult electric steel furnace was discussed recently before the London branch of the British Foundrymen's Association by D. D. MacGuffie. The furnace referred to is a 3-ton Heroult furnace at the plant of the London Foundry Co., Brimsdown, England. The power used in an alternating current from a local power station, transmitted at 10,500 volts. The furnace is 3-phase and there are three 200-kw. transformers of the Berry type which step the current down to 80 volts. Tilting is accomplished by a 12-hp. motor. An abstract of the paper entitled, "Electric Furnace Facts and Practice," is as follows:

"The furnace itself is a simple plate shell on rockers which fit into recesses for studs to prevent the furnace from slipping when tilting backward or forward. Most important is the lining of this shell. The materials used are fire bricks, magnesite bricks, silica bricks and dolomite. The magnesite bricks should be near the following composition: Magnesia, 85.96 per cent; iron, 7.98 per cent; alumina, 3.82 per cent; silica, 1.44 per cent; alkalies, 0.80 per cent. The silica brick should be: Silica, 95.10 per cent; alumina, 1.80 per cent; iron oxide, 0.60 per cent; lime, 2.0 per cent; magnesia, 0.20 per cent; alkalies, 0.50 per cent.

"Raw dolomite, which is a magnesium limestone, to be good dolomite should be near the following composition: Calcium carbonate, 53.44 per cent; magnesia, 44.19 per cent; alumina, 0.60 per cent; silica, 0.75 per cent; iron oxide, 0.68 per cent; water loss, etc., 0.34 per cent. These are the analyses of material supplied by General Refractories, Kelham Island, Sheffield.

"When the furnace is being worked basic, with dolomite and magnesite, the entire bottom is bricked with firebricks on edge, care being taken to see that every brick is bedded on to the shell. All joints in this layer should be of fine fire-clay, and so close that the bricklayer cannot get the point of his trowel between them. After the firebrick bottom is in, bricking the sides is commenced with magnesite bricks, all joints being made of ground magnesite and hot tar mixed over a fire and used hot, dipping the brick face used for the joint in hot tar. Care should also be taken to have good joints if the furnace is to have a good run. The magnesite bricks are laid about two layers above the sill of the furnace, and silica bricks follow. These are not so expensive as magnesite bricks, and as they are out of the way of the basic slag they answer the purpose. The joints are made with silica cement ground very fine, so that when the furnace gets hot all the silica part of the lining fuses together and forms a solid block. The silica lined part of the furnace is brought up to about 1 in. from the top or level where the roofing fits. This allows a layer of ganister or silica cement to be put on, so that when the roof is put into position it beds itself and makes a good joint. The roof has four lugs, which fit on to cotter pins, so that when cottered up it does not slip during tilting.

A Bottom of Dolomite

"The dolomite bottom of the furnace is the most important part of the lining. The dolomite must be quite fresh, for being a calcined magnesium limestone it perishes in a damp atmosphere. It is useless to use any that has gone nearly to powder. The dolomite should be purchased rough and a small crusher installed to crush it as required to pieces about $\frac{3}{4}$ -in. mesh. When crushed it should be spread out on a large plate over a fire, and if there is no mixer available about two barrowfuls at a time should be worked by turning it over continually until nicely warm. It should then be mixed with hot dehydrated tar, using one pint of pitch

to 2 gal. of tar. The tar should be just simmering before being used, and the mixing of the dolomite should be watched to see that enough, but not too much, tar is put in to bind it. The mixture should be turned over and over while on the hot plate to make sure the dolomite is thoroughly mixed.

"The next thing is the ramming of the bottom of the furnace. The firebrick bottom should be tarred with a stiff brush, the warm dolomite put into the furnace and rammed by hand with hot rammers (the heads of which should be 6 in. round by 1 in. thick) in layers of about 2 in. to 3 in. at a time. Men for this work should be strong, as the bottom has to be rammed very hard—the harder the better to get good results. When ramming the furnace bottom has been once started, it should not be stopped until completed. If not properly done the bottom may only last a few days before it begins to come up in flakes—so badly perhaps as to necessitate shutting down the furnace for a new bottom.

Construction of the Roof

"Considering next the roof of the furnace, this is simply a ring with an internal flange about 3 in. wide. The roof is placed on a wooden template with three round holes about $1\frac{1}{2}$ in. in diameter, to take round plugs, so that when the bricks are placed round they form three round holes where the electrodes pass from the holders through the roof on to the charge of scrap. The roof is not flat, but arched about $2\frac{1}{2}$ in. to the center. The material used for the roof is the best silica bricks, and should last the life of the furnace brickwork. When bricking the roof pieces of hard wood the length and breadth of a brick are laid between the bricks at about every three bricks to allow for expansion. Without this precaution the ends of the bricks would chip. Between the bricks is put fine silica cement, with the joints kept very close and the bricks well bedded to one another. Finally well-mixed silica cement is used to make the outside of the roof airtight by covering it all over. Then when the furnace gets to a temperature of about 1600 deg. C. the roof has no outlets between the brickwork except where the electrodes pass through. The whole of the roof frits together and forms a solid mass of silica. If the silica bricks are good and the furnace worked correctly the roof should last about six weeks of continuous running day and night without any trouble.

Heating up the Furnace

"Old disused carbons that are too short or unfit for use should be broken up into pieces about 5-in. to 6-in. mesh and laid all over the bottom of the furnace. The electrodes should then be put into position and current put on the broken electrodes by contact, making sure that even heating is obtained all over the furnace bottom. If contact cannot be secured by reason of the pieces not touching, they should be adjusted by a long piece of wood. The dolomite being a conductor, the bottom soon begins to heat; but not more than 200-kw. current should be used for the first hour or two; after that the current should be shut off for one hour to let the furnace heat up slowly. During the next two hours the power should be gradually increased to 300 to 350 kw., and then shut down for another hour to allow a soaking heat. For the next two hours the current should be 400 to 450 kw., and so on, till during the last hour it should be 500 to 600 kw. to frit all the bottom of the furnace and burn all tar out of the dolomite. The heating up of the furnace, to get good results out of the lining, should take from 8 to 10 hours. When ready all broken carbon is raked out, and the furnace

well cleaned, for if any pieces of broken carbon are left in, trouble is experienced by carbon getting in the steel.

Proper and Improper Charging

"Next comes the charging of the furnace, for the lining of the furnace depends upon the charge for protection. As an example of improper charging the following instance may be quoted: The furnace was charged up to the level of the sill or bottom of the door of the furnace, and the charge was melted down before any more was added, the power being left on while charging and thus involving risk of breakage to the electrodes, which are fragile. The banks or sides of the furnace were left bare, and the whole surface was like a mirror reflecting on the roof; the furnace sides began to run and the roof began to run by being exposed to the heat. The sides, being basic material, were attacked by the acid material running into them and cutting away the banks. It is like pouring hot water on ice to allow acid material to run to the basic bottom, and shortens the life of the furnace very much. This generally results in all sorts of suggestions being made as to improperly manufactured bricks, or bricks of inferior quality, but the trouble does not result from the materials.

"The proper charging of the furnace should be as follows: Lime first; iron ore next, if any; heavy scrap next, care being taken to keep it out of the way of the electrodes when melting; next the turnings, which should be spread all over the furnace bottom, as much turnings being put in as possible and leveled down—it does not matter if they are a foot above the door level, they afford better protection to the lining. The 3-phase Heroult type has three electrodes, and melts all the center away first, leaving a crust all round the banks and sides, so the lining is protected for a long period. When the bath is oxidized the remaining crust is pushed in, and after about 10 minutes the bath is ready for taking off the dephosphorizing slag. The bath must be very hot before taking off the first slag, so after slagging off the high current for finishing the steel is not required.

"As this part of finishing only takes from 20 to 30 minutes the backs and sides are only exposed to the high temperature for that time. The steel should always be finished as quickly as possible. When the steel is poured out the first thing to do is to repair any little defect in the banks, using crushed dolomite.

Electric Versus Other Processes

"The writer used to wonder whether the electric furnace was as good as other processes such as the Siemens, Tropenas, Stock oil-fired converter; but time and results have shown the electric furnace to be a first-class furnace. If scrap can be bought at a fair price, whether it be mild steel, nickel steel, or nickel-chrome scrap, such as turning scrap, one can make the finished article at a very reasonable figure if power is reasonable too. It is necessary to remember that all the nickel is retained in the scrap and a large amount of the chrome can be saved, or the latter can be reduced to nothing if not wanted. As a reducing furnace there is no better for reducing carbon, silicon, manganese, chrome, sulphur and phosphorus.

"When making high-class steels a good laboratory is necessary. The scrap is reduced to a practically pure iron, such as: 0.09 per cent carbon, 0.08 per cent silicon, 0.01 per cent phosphorus, 0.09 per cent manganese. If a bath sample is taken from the furnace and charges are weighed correctly and decent scrap used, allowing for 8 per cent melting loss, one can make steel to any analysis.

"We make all kinds of alloy steels in ingots and castings. We have turned out 360 tons a month at a power consumption of 600 units per ton of salable steel. Our average is well over 80 tons per week, and we often charge, as the furnace gets larger, 4 tons at a time, and complete it into steel in four hours. The cost of steel, of course, depends on the selling price of scrap and other alloys used.

"The acid-lined electric furnace is coming into use

very rapidly on account of the abundance of shell turnings available; it is a little quicker than the basic owing to the fact that it is not necessary nor possible to refine the charge."

A Double-Spindle Wood Shaping Machine

A double-spindle wood-shaping machine in which the heads revolve rapidly has been brought out by the Oliver Machinery Co., Grand Rapids, Mich. It is intended for doing rabbeting, grooving, fluting, routing, or shaping of any description, and in spite of the high speed at which the heads revolve, 7000 r.p.m., it is stated that no vibration occurs. A special type of conical bronze bearing is provided for the spindles, and guards and top bearings for the head are included in the equipment of the machine.

The table, which has a working surface of 36 x 60 in., is planed and finished by grinding. Holes 8 in. in diameter are bored to surround the two spindles. These are located on center line of the table, 18 in. from each end, and are provided with three rings, the smallest of which has an opening 2 in. in diameter.

Bronze bearings which are conical in shape are provided for the spindles. Oil chambers surround the bearings, and are relied upon to lubricate the spindles



Shaping Operations of All Kinds in Wood Are Performed on a New Double-Spindle Machine Equipped with a Special Form of Conical Bronze Bearing and Adjustable Guards for the Heads

throughout the entire length of the bearings, and the bottom of the spindle rides on an adjustable copper step which is washed with oil at all times.

The top of the table is drilled and tapped for guards for each of the spindle heads. These guards can be adjusted in any direction without, it is explained, interfering with the operation of the machine.

Protest Against Abolition of Efficiency Methods

The Western Efficiency Society, Chicago, held a meeting May 10 in protest against a rider attached to the Naval appropriation bill which would prohibit the employment of efficiency methods in work for the Navy and also prevent the payment of bonuses to workers in Government plants. Letters and telegrams from business men, efficiency experts and industrial engineers in all parts of the United States were read. All denounced the rider as pernicious.

D. E. Felt, president Felt & Tarrant Mfg. Co. and first vice-president Illinois Manufacturers' Association, stated in an address that he did not believe the rider represents the attitude of the workingmen of the United States. He asserted that once effective it surely would curtail production.

The Aetna Smelting & Refining Works is now located at 13 and 15 Centre Street, Jersey City, N. J., where it occupies the entire building.

EMPLOYMENT MANAGERS MEET

Labor Recruiting and the Federal Employment Service Discussed at Rochester

Destructive labor recruiting and the part that the Federal Employment Service may play in eliminating it proved to be the topics of most vital interest at the second national conference called at Rochester, N. Y., on May 9, by the National Committee of Employment Managers' Associations. No matter what might be its primary theme each of the papers and discussions in the well-filled program led back to one of these two topics and at the close of the conference a resolution was adopted endorsing the Federal Employment Service in its efforts to bring order out of what was referred to by one of the speakers as "the anarchy of the labor market."

The committee by which the conference was called was composed of Prof. Joseph H. Willits, Naval Aircraft Factory, Philadelphia Navy Yard, chairman; J. C. Bower, Westinghouse Electric & Mfg. Co., East Pittsburgh, vice chairman; Ralph G. Wells, of the du Pont powder works, secretary and treasurer; Raymond C. Booth, Rochester Chamber of Commerce, chairman of the committee on local arrangements; and Capt. Boyd Fisher, O. R. C., Washington, chairman of the program committee. At the final session of the conference a permanent national organization was formed with the following officers: President, Ralph G. Wells; vice-president, E. H. Fish, Norton Co., Worcester, Mass.; secretary, Raymond C. Booth, Rochester; treasurer, H. G. Kobick, Commonwealth Edison Co., Chicago. Cleveland was chosen as the next place of meeting.

The 1918 conference was originally scheduled for Cleveland, but Capt. Fisher, in his opening address, explained that it had been shifted to Rochester because of the location in that city of the first Government school for employment managers. At the opening session diplomas were presented to twenty-four graduates from the first war emergency course of this school, which was organized at the University of Rochester, last March, under the direction of Prof. Meyer Jacobstein. Letters of congratulation on the success of the course from Secretary of War Baker and Chairman Edward N. Hurley, of the United States Shipping Board, to President Rush Rhees of the University were read. It also was announced that there was a possibility of the second course at Rochester being opened to women and that applications already were being accepted from them for a Government course for employment managers at Harvard University.

Anarchy of the Labor Market

One of the first speakers at the conference was Charles T. Clayton, assistant director general of the Federal Employment Service, whose topic was, "Destructive Labor Recruiting." He declared that the situation in the labor market at the present time was nothing short of anarchy, each labor agent out-promising his neighbor and offering inducements that often proved to be untrue, so that large numbers of workmen were tempted to move from one section of the country to another only to become disgusted and to move on again or, perhaps, back to their old jobs, only to find them filled by other wanderers, thus losing time and money and increasing the disruption of the labor world. Mr. Clayton cited one instance in which a trainload of workmen had been transported to a Government plant at the Government's expense only to leave in a body the next day on being offered an increase of 3 cents an hour by the agent of a firm having a plant a few miles away. As another instance of the mania of the labor agent for getting men anywhere and at any price he told of a zealous, but absent-minded, young labor agent of Norfolk, Va., who succeeded, by raising their wages, in hiring away from his own firm two men whom he met on the street.

Such conditions as these, Mr. Clayton said, resulted in loss of time, waste of material, waste of public

funds and, worst of all, a disquieting labor unrest having its foundation in a deep suspicion on the part of the workers of the honesty, good faith and essential loyalty of the employing contractors. He said that there was an enormous transfer of labor shortly to be carried out and he gave a rough outline of the present needs as follows:

War construction	709,184
Army personnel, civilian workers	165,000
Shipbuilding	276,125
Housing	30,000
Munitions	878,800
Mines	165,916
Railways, tracks, shops	35,000
Farm labor	1,646,931
	3,928,956

Plans of Federal Employment Service

To meet such a demand, the speaker said, individual efforts were not enough, it was absolutely necessary that the government take the responsibility for the task. To this end the Government employment service had been established and expected, within the next two months, to have 350 offices in the United States, assisted by 14,000 volunteer agents covering the smaller towns and villages. The federal service asked two things: first, that all firms engaged in war contracts agree that as fast as the employment service prepared itself and informed them that it was ready to assume the responsibility, they cease individual labor recruiting and take all their labor through the service; second, that common wage scales be agreed upon by competitive districts of not too small an area. If this were done and factories also adopted systems of intensive training for foremen, leading men and workmen there need be no real shortage of labor.

At a round-table discussion, which took place following the address, the assertion was made that the Federal Employment Service took unfair advantage of its power to compel men to become members of a union and also to force union men on all manufacturing plants. This point was touched upon by Secretary of Labor William B. Wilson in his speech at the annual banquet of the delegates held at the Chamber of Commerce on Friday evening. He declared that the Department of Labor, under which the Federal Employment Service operates, recognizes the needs of all elements in the industrial world, union and non-union alike, and has no prejudices for or against union or non-union men.

Women in Machine Shops

A considerable number of women delegates attended the meeting and a large part of the program was devoted to papers and discussions on the problems presented by the unprecedented influx of women workers into industry since the war. The use of women as machinists was discussed by H. E. Miles, of the Council of National Defense, who has the supervision of the training of mechanics for war work. Where women are employed, he said, they should be employed on equal terms and wages with the men. He differed with other speakers who maintained that women should be employed only under women executives and in shops apart from the men, and recommended that, especially in munitions and ordnance plants, the women engaged should be those having fathers, brothers or sweethearts in the United States service. It was also well, he said, to employ daughters and sisters of men in the shop, or neighbors of these men, since it led to a family and community spirit which was a help and safeguard to the women.

Vestibule Schools

The need for "vestibule schools" for the training of both men and women workmen was insisted upon by Mr. Miles, who said that the placing of workmen in a shop before a strange machine, whose intricacies they were supposed to learn as best they could, resulted in loss of time and money which could ill be spared at any time and was particularly to be lamented in the present war crisis. Mr. Miles said that in both France and England the vestibule schools were required by law in every factory employing 300 or more workmen.

PIG IRON SURVEY

Subcommittee Completes Plans—Circular Asks for All Facts

CLEVELAND, May 15—(By Wire).—Plans for the survey of the pig iron industry of the country, with a view of securing a better system of distribution of iron for Government requirements and securing for the Government all the iron needed for war essential industries, were completed this week by the Subcommittee on Pig Iron, Iron Ore and Lake Transportation, and blanks to be filled out by both producers and consumers are being sent to the furnaces accompanied by the following letter, signed by H. G. Dalton, chairman of that sub-committee:

As you probably have already been advised direct from the American Iron and Steel Institute, the producers of iron and steel products are taking pledges binding themselves to make their product as large as possible during the remainder of the war and to see that the requirements of the Government and its Allies are first supplied. All of this is at the request of the War Industries Board. Doubtless you have already for your company and personally subscribed to this pledge. The demands of the Government for pig iron direct and indirect are going to be very large and at the request of the Director of Steel Supply of the War Industries Board, this committee has been asked to make a careful canvass of the pig iron situation, and be ready from time to time to advise them where the necessary requirements of the Government can be supplied. In order to do this intelligently, this committee has decided to send you this letter with blanks asking for certain statistics and showing your orders on hand, to whom the iron has been sold, the deliveries required, your estimated production for the remainder of the year, starting May 1, and also showing any balance that you may have unsold, approximately the character of iron you make, i.e. foundry, malleable, basic, etc., or the approximate percentage of each, if you make all kinds. The committee also requests that you immediately make a canvass of your customers to determine how much pig iron they have on hand at their respective plants, their probable consumption of pig iron for the year from May 1 and the percentage of their business that is either directly or indirectly intended for Government use. The direct business should state for what department of the Government their iron is being shipped and the indirect for what purpose the material is being used. It is hoped these figures can all be in within the next two weeks, and therefore you are urgently requested to compile them and send them in without delay. In order to facilitate this report, forms will be furnished promptly to you by the committee, which blanks we suggest be mailed by you to your customers, in order that the proper information may be obtained in a uniform manner. An appropriate letter should accompany these blanks urging consumers to promptly furnish the data requested and emphasizing the importance of their earnest co-operation.

The committee also begs to advise you that the War Industries Board has been energetically working to secure the blast furnaces of the country a full supply of coke and they believe that as far as railroad transportation matters are concerned, the difficulties have been practically obviated. They request that you telegraph J. Leonard Reagle, Director of Steel Supply, War Industries Board, Washington, at any time you find your supply is insufficient, stating the cause, whether it is from the lack of proper railroad transportation being furnished you, or through the failure of the coke producer, if he in turn is not filling your orders. This advice will enable them to further pursue their efforts to see that you are fully supplied. The War Industries Board will feel, in case they do not receive advice of insufficiency of coke supply, that the pig-iron producer will not have cause to explain if his plant is not operated to its full capacity barring, of course, accidents or other causes beyond his control. The producer's report is to be made in duplicate, the original to be mailed to J. Leonard Reagle, Director of Steel Supply, War Industries Board, Washington, and the duplicate to the undersigned. Your hearty and prompt co-operation in all of these matters will be greatly appreciated.

This letter indicates in a general way the information asked for in the blanks. Under indirect business, the consumers are asked to specify separately the percentage of iron required for agricultural implements, oil well and other fuel work, machine tools, cranes and other machinery directly connected with the conduct of the war. They are also to state the tonnage required for the year not already contracted for. In the blanks

for producers the furnaces will list each customer together with the data supplied on the blank sent to the customer. As soon as the survey is completed plans will be formulated for the distribution of iron by the Pig Iron Committee.

LABOR SNATCHING

Serious Condition Resulting from Recruiting from Essential Industries

WASHINGTON, May 14.—Protests against the demoralizing practice of labor "snatching" by private contractors working for the War Department are reaching the Department of Labor daily from points in Georgia, Alabama, Mississippi and Tennessee. The contractors complained of are alleged to be recruiting their labor from essential industries and from the farms within a wide radius. So demoralized has the labor situation in these States become that the Department of Labor, the shipping board and the Department of Agriculture have asked the War Department to take some action which will stop it.

Replying to a letter from Senator Fletcher, of Florida, Chairman of the Senate Commerce Committee, Assistant Secretary of Labor Post states that the War Department "is considering action which we hope will result in putting the whole subject under the direct control of the United States Employment Service, in which event it is believed that it will be possible to prevent the present demoralization of labor conditions due to the activities of the Muscle Shoals and other Government constructions in the South."

Senator Fletcher in his letter to the Labor Department charged that large numbers of men are being taken from shipbuilding plants as well as from farms, and also are being tempted away from mills engaged in getting out lumber for yards having contracts for wooden ships.

War Topics at Heavy Hardware Convention

At the convention of the American Iron, Steel and Heavy Hardware Association to be held at the Marlborough-Blenheim Hotel, Atlantic City, May 21, 22, and 23, many important subjects connected with business in war times will be discussed.

At the opening session, Tuesday, an address will be delivered by Senator James E. Watson of Indiana.

E. A. S. Clarke, president Lackawanna Steel Co., and secretary of the Committee on Steel and Steel Products of the American Iron and Steel Institute, will deliver an address at the opening session Wednesday morning unless prevented by official duties. Other speakers will be: Edwin B. Parker, Priorities Commissioner, Council of National Defense; Waddill Catchings, Chairman War Service Committee, Chamber of Commerce of the United States; C. W. Asbury, President American Hardware Manufacturers' Association, Philadelphia. The War Service Committee, of which L. S. Orr, Orr Iron Co., Evansville, Ind., is chairman, will submit his report at this meeting.

Wednesday afternoon, W. W. Orr, assistant secretary National Association of Credit Men, will discuss the subject, "Trade Acceptances from a Jobber's Stand-point." An illustrated lecture on the airplane in the war will be given by Joseph A. Steinmetz, president Aero Club of Pennsylvania.

At the open session Thursday morning, Felix H. Levy, counsel of the association, will speak on "Trade Associations in Relation to the Sherman and Clayton Laws."

The American Society of Automotive Engineers will hold a war meeting at 247 54th Street, New York, Monday evening, May 20, at 8:30 o'clock. There will be talks by Charles F. Kettering and Coker F. Clarkson, who recently returned from a trip abroad. Members of the American Society of Mechanical Engineers are invited to attend this meeting.

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Strategy That Should Not Win

Two labor disputes in the steel industry, one involving the Tennessee Coal, Iron & Railroad Co. and the other the Bethlehem Steel Co., have been brought before the National War Labor Board in a way that points unmistakably to a concerted effort of the labor unions to fasten upon the industry the eight-hour day and recognition of the unions. As told in our Washington correspondence, the action of the leaders of labor in these two cases is the boldest kind of an attempt to change basic labor conditions in the midst of the war, and in entire disregard of all pledges, express or implied, to maintain the status as it existed before the country went to war.

As is set out in the argument made at Washington on behalf of manufacturers in the Birmingham district, the issues raised by the strike of machinists in the employ of the Tennessee Company are the eight-hour day and recognition of the union. The shops involved have not been union shops; some of them, indeed, have been on the union's proscribed list. And if anything was meant by the declaration of principles adopted by the joint conference of employers and employees held before the appointment of the War Labor Board, it was that no attempt would be made in the war period to turn an open shop into a closed shop. As to the dragging of Birmingham district industries into a Federal arbitration of the eight-hour day, that is an obvious effort to maneuver a local custom into a national issue and to make a war question of what has no relation to expediting the production of war materials.

What is of grave significance in the handling of these cases is that while many men are giving themselves whole-heartedly to the task of exerting American man-power and material-power to the maximum and in the shortest time against Germany, there are others whose wits are at work first and last to gain an advantage for organized labor. It is time to put the real German label on this labor strategy. No doubt some of its authors consider themselves patriots, but they are actually working for the cutting down of production at a time when our Allies are calling for the doubling of effort all along the line. Anti-efficiency riders on appropriation bills, a shortened work day and

limitation of working forces to holders of union cards are a trinity of German allies which it is time to call by their right names.

Railroad Performance

A pregnant fact in connection with the efficiency of the railroads is that the combined length of the rolling stock is about 20,000 miles. The abstract of the Interstate Commerce Commission's report for the year ended Dec. 31, 1916, has been made public within the past few days. It shows about 29,000 miles of second track, with 2721 miles of third track. The relation between these figures is very significant. It is quite impossible for any large proportion of the rolling stock to be in operation on main line track of multiple track roads at any one time. The great bulk of the rolling stock, at any one instant, must be on single track main line, on sidings and in yards. In the case of a single track road a very considerable part of the total rolling stock that is in trains en route must of necessity be on sidings. A very large part must be in yards. The fact that the average travel of freight cars (loaded and empty) is only between 25 and 30 miles a day indicates this fact from another angle. These comparisons are close enough for the purpose of illustration, though it may be mentioned that included in the estimate of 20,000 miles length of rolling stock there are included locomotives and passenger cars, which travel a much greater mileage, and are in much more continuous movement than freight cars.

With this measure of the duty that is upon yards and sidings, it becomes very significant that there is about 10,000 miles of yard and siding track in the country. The rolling stock would occupy one-fifth the total amount of space. Much of the siding mileage is used only very occasionally. Its existence is imperative, but its actual use may average only a few minutes a day. By the amount that its use falls below the average, the service required of the remaining track is increased.

The prime fact in connection with railroad congestion is that the rolling stock can move while the track cannot. If the rolling stock were kept

equitably sprinkled over the entire mileage of track, including principally 254,046 miles of first track, 29,414 miles of second track and 102,984 miles of yard and siding track, there would be no congestion. But when there is an unusual demand for freight movement in a particular direction, as for instance, to the seaboard, the normal habitats of the rolling stock are left behind and an unreasonable duty is expected of the track facilities at terminals. Furthermore, if at any point a slight congestion develops, the tendency is for more cars to accumulate. In the total case of coal, for instance, if cars loaded with coal congest in any region the tendency is to load still more cars with coal and send them forward, thus adding to the congestion the breaking of which would have furnished to the consumer the desired coal.

These circumstances explain why it is that the railroads move a great deal of freight even when there are extremely trying cases of congestion. Through delays in freight and other means public attention is centered upon the congested areas, whereas other tens of thousands of miles of rail may be functioning very well, perhaps better than usual, as they are not so well occupied. The report just issued shows that the ton-mileage of freight in the year ended Dec. 31, 1916, was 365,771,824,741. Previous statistics referred to fiscal years ended June 30, the best showing being 343,099,937,805 ton-miles, in the twelve-month ended June 30, 1916. That was 59 per cent more than the movement in the fiscal year 1916, a very good year in its time.

The popular view was that the railroads broke down completely late last year, and in January of this year moved scarcely any freight. The monthly compilation of freight traffic statistics, however, indicates that last January the railroads moved freight at the rate of about 300 billion ton-miles a year. That was only 18 per cent less than the rate in the calendar year 1916, when conditions were practically satisfactory and it was a much greater rate of movement than obtained in any fiscal year prior to the fiscal year 1913. Yet the railroads were popularly regarded as having broken down altogether. They had "ceased functioning," to recall the term most commonly used.

What occurred was that very serious congestions developed where it was most important to move freight. The freight that most needed to move had scarcely any opportunity. Much freight that was destined to do very little good in the work the people had at heart was undoubtedly moving quite freely.

These figures show clearly that the chief work in making the railroads contribute their maximum efficiency towards winning the war is not the buying of cars and placing an additional burden upon track. The first thing is so to regulate movement as to nip incipient congestions in the bud. Then it is necessary to see that there is motive power to move freight when the cars and the tracks are there, also to build or improve terminals. Otherwise, the least little tip in the balance causes freight cars to roll into and completely fill terminals, which then cease functioning. There are 2,500,000 freight cars and nearly 400,000 miles of

railroad track in the United States. These cars and these miles of track did not cease functioning last January, but a small fraction—what was most needed—did practically fail to function.

Labor Principles for the War

The movement which resulted recently in the organization of the National War Labor Board, which hopes to maintain industrial peace throughout the period of the war, is deserving of all the attention which it is receiving at the hands of employers and employees. Among those who have discussed the conference which was continued for many weeks at Washington and the declaration of principles which it adopted, no one has spoken with more clearness than James A. Emery, counsel of the Council of National Defense. In a recent article in the *New York Times* and in an address at the New York convention of the National Metal Trades Association, he explained and elucidated the ideas of ex-President Taft and his associates on the conference board; but Mr. Emery and others have spoken guardedly on some points about which controversy could arise.

For example, take a supposititious case of non-union men and union men working together in a plant. The employer has been in the habit of receiving a committee of employees, but has refused to confer with a committee of the labor union. Suppose, now, that a committee from a labor union should ask for an audience. Would it be necessary for the employer to confer with the union committee in order to live up to the letter and spirit of the new policy? The employer doubtless would be within the letter of the recommendation of the conference if, following his established custom, he declined to receive the committee, but the wiser policy would be to receive the committee, declining, however, either to confer or to deal with it as a representative of other than his union employees, who, on their part, would be pledged not to adopt any form of coercion of unionized or non-union men or to compel the employer to deal with his employees in any other way than he had been accustomed to doing. Questions of this kind must be answered in the light of three propositions which are very clearly the basis of the conference agreement:

1. That there should be no strikes and lockouts for the duration of the war.
2. That both parties should respect and live up to the status existing before the war.

3. That where established voluntary or statutory methods do not prove adequate and differences cannot be adjusted by mediation or conciliation, they must be adjusted through an umpire appointed by the National War Labor Board.

If these principles are kept clearly in mind and employers and employees show a reasonable disposition toward each other, the country will be kept free from serious industrial disturbances throughout the period of the war. The letter written by the members of the conference to Secretary of Labor Wilson, proposing the creation of a National War Labor Board and setting forth the principles to be observed, may be compared with a constitutional document. That is, it

states principles and goes into details to fully as great an extent as it would be proper for a constitution to do, but it cannot describe exactly what procedure should be followed in every controversy.

Plot the War Activities

An incorrect view of the progress of our war activities is encouraged by the form in which information comes out. A notorious instance is that of the airplane work. Details are lacking; but a suggestion of the situation that exists may perhaps be obtained by assuming certain data. Suppose, to use conventional figures, the program was that nine months after war was declared we were to be making airplanes at the rate of ten a day, and twelve months after war was declared at the rate of 100 a day. Suppose it is found, however, that at the end of the twelve months we are making only ten a day. Then the fact is emphasized that we are making only one-tenth as many as we should be making. That is the outstanding fact, the natural form of expression of the Washington news purveyors.

There is, however, another way of looking at it. It has required one-third longer to reach the stage of ten airplanes a day than was expected. A deviation of one-third is much less violent than a deviation of nine-tenths.

If program and performance were plotted, the experienced eye would be, perhaps, but mildly shocked, and the information obtained would possibly be much more accurate and representative of conditions. It is true that time is the important element; but it is not the time that is involved in our reaching a certain, and really initial, stage that is important. It is the time involved in reaching the point where we have really produced and put in service a great deal of whatever may be involved—airplanes, ships, motor trucks or whatever it may be.

There has been a great deal of confusion on the subject of shipbuilding, resulting in a double complaint—first, that so few ships have been built up to date; second, that so much material is called for against future shipbuilding, when apparently the experience to date does not warrant so much optimism as to future consumption of material. This misunderstanding might perhaps be dispelled by consideration of the general curve of our shipbuilding program. We began with the shipbuilding facilities already in existence, attempting to speed them up, but perhaps on account of the introduction of certain new principles actually slowing them down for a time. Then we undertook to build a great many more shipways, which one by one would become active. Eventually the projection of new shipways ceased, making it that when the last shipway already planned had become productive, shipbuilding in the United States would have reached its maximum rate, after which there would be practically no further increase.

What description of curve would this program involve? Obviously a double reverse curve, starting and ending practically with tangents. Plot it by months from July 1, 1917, to Dec. 31, 1918. The production curve would start with a line prac-

tically horizontal at perhaps only a few tens of thousands of tons per month. In a few months it would begin to swing upwards, the trend being sharper and sharper, until, without an intermediate tangent, it would begin to swing around to the horizontal, probably becoming horizontal at some time not far either way from the end of this year, but ending in the hundreds of thousands of tons a month when it began in the tens of thousands.

In the matter of steel supply it is not the point in the curve that corresponds with the present date that counts, it is the point in the future representing the vessels completed for which steel must now be shipped from mills. The curve is there at a much higher point than at present, and the interval is probably somewhere in the neighborhood of six months. The Hog Island management estimates, as noted in THE IRON AGE recently, that it requires an average of 60 days from the time steel is shipped from mills until, after having passed through one or other of some three dozen fabricating plants that are serving the Hog Island yard, it finally arrives at the yard to await opportunity to place the part in the vessel. Allow three months' time in the shipway and one month after launching for the finishing touches in the fitting out basin, and there is a total of six months. The steel mill shipments of to-day must be in relation to the point in the curve six months hence, which is a much higher point than that of to-day.

Of course, the data here taken for illustration are merely assumed. There are no trustworthy factors. While some shipyards apparently figure six months or more for the completion of each vessel, the New York Shipbuilding Co. recently launched the *Tuckahoe* 27 days after the keel was laid, the vessel then being nearly completed.

In this matter of shipbuilding, however, the impression obtained is frequently predicated, unconsciously, upon some rough concept of what vessel tonnage has already been completed, whereas the important concept should be that relating to the completions that are to occur months hence. With the curve just suggested pictured in mind, what one is led to think of is the area comprised between the horizontal axis and the curve, up to date, whereas the monthly areas a few months hence are to be much greater.

American Iron and Steel Institute Meeting

The fourteenth annual meeting of the American Iron and Steel Institute will be held in the grand ballroom of the Waldorf-Astoria Friday, May 31, and there will be forenoon, afternoon and evening sessions. The papers to be presented at the meeting will be as follows:

"Address of the President, Elbert H. Gary, New York.
"The Electric Steel Plant at South Chicago," T. W. Robinson, vice-president Illinois Steel Co., Chicago.

"The Design of the Modern Blast Furnace Stack," J. G. West, Jr., general superintendent blast furnaces, Jones & Laughlin Steel Co., Pittsburgh.

"The Modern By-Product Coke Oven and Its By-Products," W. H. Blauvelt, consulting engineer, Semet-Solvay Co., Syracuse, N. Y.

"Effect of Phosphorus in Soft Acid and Basic Open-Hearth Steels," J. S. Unger, manager Central Research Bureau, Carnegie Steel Co., Pittsburgh.

"Conservation of Ferro-Manganese," papers to be arranged for by C. A. Buck, vice-president Bethlehem Steel Co.

"Relation of the Trade Papers to the Iron and Steel Industry," Bertram S. Stevenson, M. A. Hanna & Co., Pittsburgh.

Discussions of each paper under five-minute rule.

TO RATE POWER PLANTS

Supply of Coal May Be Shut Off to Wasteful Users

Ten to 20 per cent—that is, from 25,000,000 to 50,000,000 tons of coal per year—can be saved by the correct operation of steam power plants, using their present equipment, in the industries, in office buildings, hotels, apartment houses, etc., according to the Fuel Administration. The national program, which has been set on foot, comprises certain fundamentals, as follows:

1. Personal inspection of every power plant in the country.

2. Classification and rating of every power plant, based upon the thoroughness with which owner of said plant conforms to recommendations.

3. Responsibility of rating the plants, which will fall upon an engineer in each district, the rating to be based upon reports of inspectors, who will not express opinions, but will collect definite information. The State fuel administrator, in his judgment, may entirely or partially shut off the consumption of coal to any needlessly wasteful plant in his territory.

4. Inspectors are to be furnished from one or more of the following sources: (a) Inspectors of the steam-boiler insurance companies; (b) State factory inspectors; (c) engineering students from technical colleges; (d) volunteers.

The ratings will be based upon recorded answers to questions, each of which will be given a value depending upon its relative importance to the other questions. Depending upon the efficiency of methods in use in any plant, it may be rated in class 1, 2, 3 or 4.

Questionnaire to Precede Inspection

In advance of the first inspection a questionnaire will be sent to every power plant in each district, with notice to the owner that within 60 or 90 days his plant will be inspected personally and the questionnaire will be checked up by the inspector upon his visit. This action, it is believed, will tend to prepare the minds of plant owners for what will follow and will operate to produce a desire to improve plants, if necessary, so that they may be rated in a high class by the time the inspector calls.

It is recommended that a board of competent engineers be attached to the conservation committee in each State; also a corps of lecturers to arouse public interest and disseminate engineering information.

The Fuel Administration has prepared a 50-minute film of moving pictures showing good and bad operation in the steam-boiler plant, methods of testing boilers, fuels, etc. These pictures will be available for each State in connection with its educational propaganda.

The administration is also preparing a series of official bulletins on engineering phases of steam and fuel economies. Some of these are now ready for printing. They will include: Boiler and furnace testing; flue gas analysis; saving steam in heating systems; boiler-room accounting systems; saving steam and fuel in industrial plants; burning fine sizes of anthracite; boiler water treatment; oil burning and stoker operation.

In addition to this service, a list of competent engineers has been prepared in Washington for each State and is available for use of each local administration. As the work develops, still further constructive assistance is contemplated for helping owners to bring their plants up to a high plane of economic operation.

Thomas R. Brown, Pittsburgh, has been appointed administrative engineer for the Pittsburgh district, and C. P. Billings special staff assistant. These appointments were made as a preliminary step toward putting into operation the general plan for fuel conservation in power plants.

The Portland Specialty Mfg. Co., Portland, Conn., has been succeeded by the Portland Foundry Co., which has installed new equipment doubling its capacity for turning out small and medium gray iron castings.

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STEEL PRICES AFTER APRIL 1

Washington Ruling Confirming the Decision of the Steel Committee

Chairman E. H. Gary of the Committee on Steel and Steel Products of the American Iron and Steel Institute made the following announcement at New York on Tuesday, May 14:

The War Industries Board has confirmed this committee's interpretation of President Wilson's announcement of Dec. 28, 1917, viz: that all deliveries of iron ore, pig iron, bar iron, steel and steel products, made on and after April 1, 1918, under contracts entered into on and after Dec. 28, 1917, shall not be invoiced at prices higher than the maximum prices in effect at time of delivery, as specified in President Wilson's announcement of March 27, 1918. It is hoped that all buyers and sellers of any of the above products will be governed by this ruling."

Gale Destroys Ore Bridges

In a storm of cyclone dimensions which swept over Chicago on May 9 two ore unloading bridges were blown down and practically destroyed. One was lost by the Iroquois Iron Co., South Chicago, and one by the Inland Steel Co., Indiana Harbor. Both will be replaced at once. The structure at Indiana Harbor was badly twisted and is being cut apart with acetylene torches. The throwing of more work on other bridges at both places will cause some inconvenience.

The name of the Inland Steel Castings Co., Terre Haute, Ind., has been changed to the Inland Malleable Iron & Steel Co. This was done because most of the business of the company is in malleable iron castings.

Drive for Eight-Hour Day at Steel Works

Labor Unions Aim to Establish New Conditions in the Industry Through a Strike in the Birmingham District

WASHINGTON, May 14.—The National War Labor Board on May 9 took up in executive session for preliminary examination the controversy in the Birmingham district between the Tennessee Coal, Iron & Railroad Co. and other iron and steel producers on the one hand and their employees on the other, over the adoption of an eight-hour day, certain overtime allowances, and the recognition of the unions. Several sessions have been held, but no decision has been reached as to whether the board will take jurisdiction of the case. It is claimed by the manufacturers that the matter is not within the scope of the board's authority, in view of the declaration of principles adopted by the joint conference of employers and employees held before the appointment of the board, at which it was agreed that the *status quo ante* should be maintained throughout the war with regard to all such basic issues as the eight-hour day and recognition of the unions. Although 19 officials of the iron and steel companies in the district were named in the subpoena by the board, it was understood that at the preliminary meeting they would not be required to be present, but would be represented by counsel, and Forney Johnston therefore appeared in their behalf. The small group of striking employees was represented by James O'Connell, head of the metal workers' section of the American Federation of Labor.

The case for the striking workmen as presented by O'Connell was based chiefly upon the refusal of the steel manufacturers to recognize the unions, and the impression gathered from an examination of the record is that the sympathetic strike of last February, which failed to accomplish its purpose, had no other object than to bring about the unionizing of the workers in the Birmingham district in the expectation that this would serve as an entering wedge with which to secure the organization of the iron and steel workers in all districts.

Shipyard "Drive" and Strike Timed

A sinister aspect of the case is the indication that the "drive" to secure workers for shipyards, which began last February, was carefully synchronized with the strike in the Birmingham district. It was thus rendered practicable for the union leaders to guarantee work at increased wages in the shipyards if they would agree to quit their employment in the Birmingham field.

On behalf of the steel companies it was made clear through statements by Mr. Johnston and letters presented by President Crawford of the Tennessee Coal, Iron & Railroad Co., President Dovel of the Sloss-Sheffield Steel & Iron Co., and others, that the strike has not assumed proportions that constitute a serious disturbance of manufacturing conditions in the Birmingham district. Production is up to normal, the labor supply is fairly satisfactory, and only a negligible percentage of the workers are on strike. Mr. Johnston, therefore, contends that the National War Labor Board has no jurisdiction over the dispute, which has not assumed the proportions necessary to bring it within the scope of their authority. In a formal statement of protest against the assumption of jurisdiction by the board Mr. Johnston says:

The evidence on file with the board demonstrates that without exception every plant in this group is working to normal or in excess of normal capacity.

Production is limited under these circumstances only when the orders are not on hand.

There exists entire accord between the manufacturers and their present employees. This applies to plants engaged in war work as well as those confined to strictly local work. There is accordingly no occasion whatever to disturb the status quo by intervention at this time.

About 300 of the employees of this group walked out at the time of the strike of Feb. 20, 1918; many left to avoid friction with strikers; some have returned and others have left; about twenty-five of the whole remain unemployed due to their own desires.

This group of manufacturers desire to be governed by the spirit of the organic act creating the board, and to work in harmony with its desires, but this does not mean that its offices would be acceptable in cases involving purely local production, or in a case clearly having no relation to war production or in disturbing local custom or industrial equilibrium by recommending the adoption of any general social policy such as the eight-hour day which is inconsistent with the custom of the locality and is subject to adjustment in accordance with local and State action rather than by Federal intervention of any kind.

These manufacturers are in entire accord with their men and if left alone by the War Labor Board they will continue with their local and war production, but if the board insists on making up an issue, not as between their present employees and the plants but with the trade unions with whom the plants have no relation and which do not purpose to represent any present employee of these manufacturers, the latter will be forced to protest against the action and jurisdiction of the board.

None of these plants are union shops. Many of them are proscribed by the union.

When demands were made in February, the plants found that the demands would work radical changes in plant conditions at the time of acute shortage in skilled labor. This demand was made coincident with the drive of the Labor Department for shipyard volunteers and found many of these plants in the midst of war production. No employee had complained of wages or conditions. It is not even now contended that there was any tangible or substantial grievance on the part of the men.

The general eight-hour day is not germane to the functions of the board.

The President's proclamation carefully defines the powers, functions, and duties of the board. These are confined to "controversies arising between employers and workers in fields of production" necessary for the effective conduct of the war or in other fields of national activity where delays and obstructions which might . . . affect detrimentally such production.

It could not have been the intention of the President for this board to enter the field of social legislation in local matters within the exclusive jurisdiction of the States when war production would not thereby be advanced.

We earnestly urge that this is no opportune time to readjust general social conditions. Winning the war is scarcely more difficult than the solution of complex industrial relations. One such problem at a time is enough. The national authorities have the unqualified support of the manufacturer.

It seems reasonably clear from the argument of Mr. Gompers and his associates that the real purpose of this proceeding is to require the United States Steel Corporation and its subsidiaries to inaugurate a horizontal eight-hour day.

In summarizing his argument against the right of the National War Labor Board to take jurisdiction of this case Mr. Johnston says:

1. There is no existing controversy between this group of manufacturers and their employees.
2. There has been no lockout by any of this group.
3. War production is normal in all of these plants and no obstruction or impediment to war production exists which could be removed by mediation or which requires mediation.
4. The eight-hour day has not existed in the locality involved, is not required by law, or war agreement in any instance, where it is not strictly observed; is a matter of strict State and local cognizance and clearly beyond the advisory functions of this board, of the potential action of Congress or the executive. Its injunction into the Birmingham situation invites a denial of the jurisdiction of this board at the threshold of its action.
5. The enforcement of the eight-hour day in localities and industries where it is not observed cannot in any case be said to assist war production. It cannot afford an original basis for mediation by this board.

In conclusion permit us to add the suggestion that any effort to force upon the manufacturers cited in this proceeding a local and internal request not demanded by their workmen, or by the community would materially interfere with State progress toward a better understanding between employers and workmen in that territory, better working conditions and a final and just solution of the problem. Marked progress has been accomplished in that direction. This is no time to interfere with that progress and no time to disorganize industry in the Birmingham district.

President Crawford's Statement

The attitude of the Tennessee Coal, Iron & Railroad Co., which holds that the present labor troubles in the Birmingham district are not such as to give the National War Labor Board jurisdiction, is set forth in a letter filed with the board by President Crawford, in part as follows:

Receipt is acknowledged of your letter of May 2, 1918, addressed to the Tennessee Coal, Iron & Railroad Co. I should like to be advised in detail as to what complaint has been made against this company by Mr. O'Connell, and if there is anything in writing to have a copy of the same. From information I have received, I doubt if he represents any considerable number of our employees, past or present. I think our employees generally are satisfied with their conditions and are making no complaint. Also I have heard the opinion expressed that the proceedings instituted by Mr. O'Connell and his associates are for the real purpose of extending if possible the influence of labor unions which as is well known we have not recognized, although we have not attempted to interfere with the unions as such.

Seven hundred and twenty-one of about 6000 of our men were induced to quit work. One hundred and sixty-four of these men at their request have been re-employed. Three hundred and sixty-three of the positions made vacant have been filled by promotion of old employees and by new men. The positions still vacant are 194. Most, if not all, of those not re-employed have sought and obtained situations elsewhere. We would be glad to re-employ most of them if they make application. We have not refused to re-employ any of them on the ground that they were members of the union.

All of our plants are proceeding at a normal rate, and the conditions are satisfactory both to the company and to the employees. Under the circumstances we do not think that we have any proper subject for arbitration.

Bethlehem Steel Co. Case.

The National War Labor Board has assumed jurisdiction in the case of the Bethlehem Steel Co. at whose plant at Bethlehem, Pa., there is a dispute between a group of workers and the company which the Federal conciliators assigned to the task have found it im-

possible to compose. The board has taken up this case on the basis of the following representation by the Department of Labor of its inability to settle the dispute:

That on or about April 15, 1918, complaints were received from the employees of the Bethlehem Steel Co., at Bethlehem, Pa., that disputes had arisen between said employees and said company involving conditions of employment in said plant; that Conciliators Fred L. Feick and E. P. Marsh were directed to go to Bethlehem and investigate conditions, with a view of bringing about an amicable settlement between the contestants; that they were joined by representatives of the Department of Labor and Industry of Pennsylvania, and after full and patient hearing of both sides to the controversy our conciliators reported to this department that an amicable adjustment had been reached, and that the machinists who had ceased work had returned.

That on or about April 23 additional complaints reached this department from the electrical workers of said company, and Conciliators E. P. Marsh and J. L. Spangler were directed to go to Bethlehem, and, in conjunction with Senator Walter McNichol of the Department of Labor and Industry of Pennsylvania, again take up the matter with the employees and the company for a final adjustment; that after a careful and exhaustive examination on the part of the conciliators they found that the machinists had quit work and the electrical workers, while remaining at work, were dissatisfied, and threatened to quit their places; the Department is satisfied that every effort at conciliation was made by its representatives on the ground, but failed to bring the parties together on any terms whatever; after notifying the employees that no adjustment could be brought about, the employees requested this department to request that the War Labor Board should assume jurisdiction and fully investigate the merits of the controversy, with a view of a permanent adjustment and settlement.

This department has exhausted its efforts through its conciliators to reach a satisfactory result, and therefore respectfully requests that the War Labor Board, by virtue of its authority under the proclamation of the President, investigate the merits of the controversy and bring about peaceful and harmonious relations between employers and employees.

The prospective witnesses in this case include President Eugene Grace, Superintendent R. A. Lewis, Shop Superintendent J. Straum, and assistant Shop Superintendent William Shafer, of the Bethlehem Steel Co.; Howard Ellis, president of the Electrical Workers' Union, and a committee of electrical workers; David Williams, business agent of the Machinists' Union, and a committee of machinists.

Thomas J. Savage, representing labor, and Herbert H. Rice, General Motors Co., Detroit, representing capital, were named to-day to investigate demands of Bethlehem Steel Co. workers by the National War Labor Board. They also are expected to take up demands of the strikers at Birmingham, Ala.

W. L. C.

Molders' Strike Submitted to National Labor Board

The striking molders of Chicago, most of whom are employees of union foundries, submitted their demands last week to the National War Labor Board, Washington, over which former President William H. Taft and Frank P. Walsh preside. The strikers were offered \$5.25 per day of 8 hr., but want \$5.50 per day for the next six months and \$6 per day thereafter.

The War Labor Board at Washington instructed the men to return to work pending a decision of the board. The men held a mass meeting Monday, at which they heard the report of their representatives and voted to go back to work as advised. With possibly one exception, all open and all union shops are now running full, the exception being the Chicago Steel Foundry Co., where a number of men went out Monday morning, most of them of foreign extraction. The management of the foundry has been asking its men to sign an agreement that they would give their full co-operation and best services toward the production of Government work. It is considered not unlikely that enemy aliens fomented the trouble, inasmuch as no demands were made prior to the walkout.

Iron and Steel Markets

WAR BUSINESS GROWS

Neville Island Gun Plant Means Large Contracts

Ship Plate Program for 18 Months—40,000 Tons of Rails for South Africa

The selection of Neville Island in the Pittsburgh district as the site for the great gun and projectile plant to be built by the Government and the Steel Corporation, as indicated in this column some weeks ago, means the early letting loose of large orders for structural steel and equipment. Guns will not be turned out for 18 months, but meantime \$60,000,000 to \$70,000,000 will be expended.

This project, with the large force of workmen that must be organized for it, just as fresh hundreds of thousands are being withdrawn from industry for war service, points to a progressive shifting of men to the most essential lines. Each week makes it clearer that great changes are ahead.

Some manufacturers already know that their present stocks of pig iron or of rolled steel will not be replaced and they cannot turn quickly enough into war channels to avoid a shutdown.

While the concentration of pig iron and steel capacity on Government needs can be worked out for a time, the problems of the dislocations in consuming industries are not so easy, in particular the idleness for larger or shorter periods of considerable bodies of men.

Ship plate and shell steel programs have been expanded in the past week. In addition to 4,000,000 tons of shell steel at first scheduled for this year, 1,250,000 tons is now figured on to carry the Government and its Allies up to April 1. Ship plate requirements for 1918 are now put at 1,450,000 tons and those for 1919 at 1,850,000 tons. With plate mills that will be completed in 1918, capacity of all kinds of plates by the end of the year will exceed 7,500,000 tons.

Steel capacity in all lines exists in plenty, but it is the specter of short fuel supply that is behind all the predictions of long-continued monopoly of steel output by the Government. Ingots production in April was at the yearly rate of 43,000,000 tons. A year at that rate would mean a very considerable surplus above war needs, direct and indirect.

Iron and steel jobbers have just presented their case at Washington. Theoretically their prospects of getting steel are fair, but priority difficulties are many. Already leading jobbers have fallen in line with steel makers and are requiring buyers to show war use of material called for.

Material for the 100,000 cars the Government has bought has not been placed and more delays are ahead. It was planned to have steel wheels for 55,000 cars, but to save steel cast-iron wheels will be used for many of these. Bar-iron makers have asked that arch-bar trucks be specified for a part of the cars, giving them some tonnage that would otherwise be steel.

Bids have been asked on 300,000 axles for the new cars. All told 400,000 will be needed. No price has been fixed as yet for axles, but the trade believes the Railroad Administration does not expect to pay more than 4.25c. per pound or about \$15 per ton below the basis of late sales. Signs point to an award on makers' cost figures with an estimated margin of profit, as with the car contracts, if the bids are not deemed low enough.

Prospects are good for the substitution of Bessemer steel for open-hearth in a portion of the 1918 rail orders. Next year's rollings will include 40,000 tons of Bessemer rails which the Steel Corporation will furnish the British Government for South African railroad extensions.

Steel manufacturers have accepted the proposed new standard of 70 per cent instead of 80 per cent ferromanganese and 16 per cent in the case of spiegeleisen. Ferromanganese made from domestic ores will be used to the largest possible extent as the result of last week's Pittsburgh meeting of the steel companies.

It is now expected that the order stopping ferromanganese imports May 13 will be modified to admit 8000 to 10,000 tons, in view of the small imports of Brazilian ore in April and May. That much more than 20,000 tons a month must be brought from Brazil in the remainder of the year is now admitted.

Timely additions have been made to the list of producers of low phosphorous pig iron, three eastern Pennsylvania furnaces having been burdened for short runs on such iron. Ore supply is still a problem and arrangements may be made for the bringing in of Swedish ore.

The inability of cast-iron pipe manufacturers to get sufficient pig iron to keep going is a serious question. The manufacturers' association and the American Water Works Association are taking steps to present their problem at Washington, particularly the needs of industrial towns whose populations have been greatly increased by war work.

Pittsburgh

PITTSBURGH, May 14—(By Wire).

The one leading item of interest in the local steel trade this week is the official announcement that the great Government plant for the manufacture of guns and projectiles is to be located on Neville Island, Pittsburgh. The Carnegie Steel Co. has on this island Neville Island furnace, a 500-ton stack, which it took over in 1908 from the American Steel & Wire Co. Steel works will be built on Neville Island to supply the new plant, which will embrace the largest works in the world devoted to the manufacture of guns and projectiles. There are nearly 1000 acres on Neville Island

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	May 14	May 7	Apr. 16	May 16
Pig Iron, Per Gross Ton:	1918	1918	1918	1917
No. 2 X, Philadelphia....	\$34.25	\$34.25	\$34.25	\$43.50
No. 2, Valley furnace....	33.00	33.00	33.00	42.00
No. 2 Southern, Cincinnati.	35.90	35.90	35.90	42.90
No. 2, Birmingham, Ala..	33.00	33.00	33.00	40.00
No. 2, furnace, Chicago*.	33.00	33.00	33.00	44.00
Basic, deliv., eastern Pa..	32.75	32.75	32.75	38.00
Basic, Valley furnace....	32.00	32.00	32.00	42.00
Bessemer, Pittsburgh....	36.15	36.15	36.15	44.95
Malleable, Chicago*....	33.50	33.50	33.50	44.00
Malleable, Valley.....	33.50	33.50	33.50	42.00
Gray forge, Pittsburgh....	32.75	32.75	32.75	40.95
L. S. charcoal, Chicago... .	37.50	37.50	37.50	46.75

Rails, Billets, etc., Per Gross Ton:

Bess. rails, heavy, at mill.	55.00	55.00	55.00	38.00
O-h. rails, heavy, at mill.	57.00	57.00	57.00	40.00
Bess. billets, Pittsburgh....	47.50	47.50	47.50	85.00
O-h. billets, Pittsburgh....	47.50	47.50	47.50	85.00
O-h. sheet bars, P'gh....	51.00	51.00	51.00	85.00
Forging billets, base, P'gh.	60.00	60.00	60.00	105.00
O-h. billets, Philadelphia.	50.50	50.50	50.50	75.00
Wire rods, Pittsburgh....	57.00	57.00	57.00	85.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia ...	3.685	3.685	3.685	4.159
Iron bars, Pittsburgh....	3.50	3.50	3.50	4.00
Iron bars, Chicago....	3.50	3.50	3.50	3.50
Steel bars, Pittsburgh....	2.90	2.90	2.90	4.00
Steel bars, New York....	3.095	3.095	3.095	4.169
Tank plates, Pittsburgh....	3.25	3.25	3.25	6.50
Tank plates, New York...	3.445	3.445	3.445	6.919
Beams, etc., Pittsburgh....	3.00	3.00	3.00	4.00
Beams, etc., New York...	3.195	3.195	3.195	4.419
Skelp, grooved steel, P'gh.	2.90	2.90	2.90	3.50
Skelp, sheared steel, P'gh.	3.25	3.25	3.25	5.50
Steel hoops, Pittsburgh...	3.50	3.50	3.50	4.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	May 14	May 7	Apr. 16	May 16
Per Lb. to Large Buyers:	1918	1918	1918	1917
Sheets, black, No. 28, P'gh.	5.00	5.00	5.00	7.00
Sheets, galv., No. 28, P'gh.	6.25	6.25	6.25	8.00
Wire nails, Pittsburgh....	3.50	3.50	3.50	3.50
Cut nails, Pittsburgh....	4.00	4.00	4.00	3.75
Fence wire, base, P'gh....	3.25	3.25	3.25	3.45
Barb wire, galv., P'gh....	4.35	4.35	4.35	4.35

Old Material, Per Gross Ton:

Carwheels, Chicago....	\$29.00	\$29.00	\$29.00	\$25.50
Carwheels, Philadelphia...	29.00	29.00	29.00	27.00
Heavy steel scrap, P'gh....	28.50	28.50	28.50	29.00
Heavy steel scrap, Phila....	29.00	29.00	28.00	25.00
Heavy steel scrap, Ch'go....	29.00	28.50	28.50	28.50
No. 1 cast, Pittsburgh....	28.50	28.50	29.00	26.00
No. 1 cast, Philadelphia...	29.00	29.00	29.00	29.00
No. 1 cast, Ch'go, net ton.	27.00	27.00	27.50	22.00
No. 1 RR. wrot, Phila....	34.00	34.00	34.00	41.00
No. 1 RR. wrot, Ch'go, net	29.75	29.75	30.36	31.00

Coke, Connellsburg, Pet Net Ton at Oven:

Furnace coke, prompt....	\$6.00	\$6.00	\$6.00	\$8.00
Furnace coke, future....	6.00	6.00	6.00	7.50
Foundry, coke, prompt....	7.00	7.00	7.00	9.00
Foundry, coke, future....	7.00	7.00	7.00	9.00

Metals:

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	23.50	23.50	23.50	31.50
Electrolytic copper, N. Y.	23.50	23.50	23.50	31.50
Spelter, St. Louis.....	7.12 1/2	6.62 1/2	6.75	9.12 1/2
Spelter, New York.....	7.37 1/2	7.12 1/2	7.00	9.37 1/2
Lead, St. Louis.....	6.70	6.42 1/2	6.80	10.37 1/2
Lead, New York.....	6.90	6.62 1/2	6.95	10.50
Tin, New York.....	\$1.00	\$1.00	87.00	65.75
Antimony (Asiatic), N. Y.	12.75	13.00	12.75	26.00
Tin plate, 100-lb. box, P'gh.	\$7.75	\$7.75	\$7.75	\$8.50

available for the plant, which will be built complete and operated by the United States Steel Corporation for the Government. The entire work of building the plant will be in charge of a building committee, which has already been appointed, and will be supervised by a general manager. The locating of this plant in Pittsburgh will be of great benefit to this city, as it will employ thousands of men in its construction and many thousands of tons of steel will be used in building it. It will be nearly two years before any war material is turned out, but no doubt contracts for the foundation, buildings and equipment will go largely to Pittsburgh companies. No details are ready as yet as to sizes of buildings and equipment needed, but this will develop in a short time. It is the intention to push work on this immense plant as fast as possible, and probably in order to expedite the building of the plant the Government will issue priority orders on the companies that are to furnish the buildings and equipment. Neville Island is an ideal site for the works, all the ground being above flood stage on the Ohio River, and for the main reason that the location is so far inland.

The local steel business is now on a more strictly Government basis; that is, practically 100 per cent of all the finished steel products being made in the Pittsburgh district now are going to the Government, as will likely be the case for some months to come. The commercial demand for iron and steel products has been small for some time, yet local manufacturers of finished steel products say that every day they are turning down orders from desirable customers, informing them that they are giving 100 per cent of their output to the Government. So far as known, no manufacturing plants in the Pittsburgh district not making war essentials have yet closed down for lack of steel, with the exception that a small hoop and band mill of the Carnegie Steel Co. at Monessen, Pa., has been closed in order to allow the steel to be diverted to other plants of the company where it is so badly needed. There is no doubt, however, that within a short time some small manufacturing plants in this district will have to close

temporarily, as they will be unable to get steel. Output of pig iron, semi-finished steel and finished steel products in the Pittsburgh district is now at a higher rate than at any time since last summer. There is some shortage in the supply of labor, but as yet this is not being seriously felt. However, when the real hot weather comes there will likely be a falling off in steel output, as many men seek other fields of labor, being unable to stand the intense heat of the mills.

Billets and Sheet Bars.—There is no surplus steel in the form of billets or sheet bars to be had in the open market and the fact that the Government is now taking practically 100 per cent of the output of open-hearth steel means that Bessemer steel will have to be used in the manufacture for non-war purposes, of products in which open-hearth steel was formerly used entirely. Some companies making war essentials are able to get ingots and billets from other steel works, but only on Government orders which takes this steel for the manufacture of war essentials. The shortage in supply of sheet bars is cutting down output of sheets, but so far has not affected tin plate to any extent. There is some inquiry for forging billets and for these as high as \$85 to \$90 is being quoted on high carbons.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, sheet bars \$51, forging ingots \$73, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Pig Iron.—There is some urgent inquiry for Bessemer and basic iron, but no sales have been made, simply for the reason that intending buyers have not been able to find the iron. The Colonial Steel Co. has an inquiry out for 5000 tons of Bessemer iron for last half of the year, the Allegheny Steel Co. wants 1000 tons of Bessemer and an indefinite quantity of basic for the same delivery. The Committee on Pig Iron, Iron Ore and Lake Transportation is now having the blanks prepared to be sent to all blast furnaces and pig iron consumers, in order that a complete survey of the present situation in pig iron can be made. As noted in our report last week at some length, it is the intention to

gather complete details of sales of pig iron by the furnaces for delivery from May to December, inclusive, where the iron is going and the purposes for which it is to be used. By making this survey it is believed that a good deal of pig iron now being melted and not going into the manufacture of war essentials can be saved and diverted to the latter products. This survey is expected to be completed within the next two weeks. In the meantime, it is impossible for intending buyers to place any orders for iron, furnaces being sold up largely over the remainder of this year, while steel works that have blast furnaces would also be glad to buy iron if they could find it. Stocks are very light, but at the heavy rate at which pig iron is being produced it is hoped there may be some relief from the shortage in supply in the near future. Prices in effect for this quarter are as follows:

Basic pig iron, \$32; Bessemer, \$35.20; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable, \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Steel Rails.—It seems to be pretty definitely settled that at least part of the rails which the Government is expected to place in the near future will have to be rolled from Bessemer steel. The scarcity of open-hearth steel is getting more acute and if the Government insists on all these rails being rolled from open-hearth stock, it would simply mean taking open-hearth steel from the manufacture of other products that are needed as badly as rails. The demand for light rails is very active but practically nothing is being done in standard sections. The Government price on 25-lb. to 45-lb. sections is \$3 per 100 lb. f.o.b. Pittsburgh, while on standard sections on which there are no Government prices mills are quoting in small lots \$61 to \$63 for Bessemer rails and \$63 to \$65 for open-hearth at mill.

Ferroalloys.—Last week a meeting of operating heads of steel companies was held in the Carnegie Building in this city to discuss the present situation as regards supply of ferromanganese. The Government has requested that as far as possible domestic manganese ores be used in the manufacture of ferromanganese in order to release the ships that have been carrying foreign ores into this country for other service. The meeting was held to consider the question whether it is feasible to operate the steel plants on lower grade ferromanganese and do it successfully. The consensus of opinion was that every possible aid should be given to the Government, and it is stated the operating officials of the steel works pledged themselves to use as far as possible ferromanganese made from domestic ores. Practically the same action was taken in regard to the use of ferrochrome. A local steel company has bought 500 tons of domestic ferromanganese for last half of the year delivery on the basis of \$250 at furnace for 70 per cent, but has the privilege of specifying a higher percentage of ferromanganese, if it desires, by paying an additional \$4 per unit over 70 per cent which would make 80 per cent \$290 at furnace. A consumer is said to have been offered 50 per cent ferrosilicon for delivery over last half of this year at \$150 at furnace, but this is not confirmed. We quote 70 per cent domestic ferromanganese at \$250 at furnace, 50 per cent ferrosilicon at \$160 at furnace for last half of the year delivery and for prompt shipment \$165 to \$170 at furnace. We quote 16 to 18 per cent spiegeleisen at \$65 to \$70 at furnace. Sellers usually allow freight on ferroalloys to point of delivery.

We now quote 9 per cent Bessemer ferrosilicon at \$54, 10 per cent, \$55; 11 per cent, \$58.30; 12 per cent, \$61.60. We quote 6 per cent silvery iron, \$40; 7 per cent, \$42; 8 per cent, \$44.50; 9 per cent, \$47; 10 per cent, \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New, Straitsville, Ohio, these furnaces having a uniform freight rate of \$2 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—No local jobs were placed in the past week, local fabricators stating that practically 100 per cent of their entire output is now going to the Government on direct or indirect orders. The American Bridge Co., McClintic Marshall Co. and the Fort Pitt

Bridge Works are all turning out large quantities of fabricated steel work to be erected in France. We quote beams and channels up to 15 in. at 3c. at mill.

Plates.—It is understood that plates, shapes and bars for the Government orders for cars placed recently will soon be placed with the mills through J. L. Reagle, Director of Steel Supply. The Cambria Steel Co. has taken 500 tank cars for the F. M. Pease Co., Philadelphia, and the Thompson-Starrett Co. has placed 400 gun cotton cars with the Kilbourne & Jacobs Co., Columbus, Ohio. Local plate mills are giving 100 per cent of their production to the Government and will do so as long as it is needed. We quote $\frac{1}{4}$ in. and heavier sheared plates at 3.25c. at mill Pittsburgh.

Iron and Steel Bars.—Practically the entire local output of iron and steel bars is being shipped to the Government on direct and indirect orders. However, it is not believed the Government will continue to take all the iron and steel bars produced by the mills for any considerable time, probably for not more than 60 to 90 days. In the meantime, concerns using iron and steel bars in the manufacture of products not classed as war essentials are likely to have their supply cut off. Prices are very strong and for this quarter are as follows: Steel bars rolled from billets 2.90c., from old steel rails 3c., and refined iron bars, 3.50c. at mill Pittsburgh.

Sheets.—The independent sheet mills operated last week at an average of nearly 85 per cent of capacity, but the American Sheet & Tin Plate Co. is running at from 50 to 55 per cent of capacity, so that the general average is from 70 to 75 per cent, the American Sheet & Tin Plate Co. being credited with about 37 per cent of the total sheet capacity of the country. Sheet mills are giving 100 per cent of their output to the Government, whose purchases are very heavy in black, blue annealed and painted corrugated sheets, its purchases of galvanized sheets being rather light. Recently Government orders for different grades of sheets amounted to 30,000 tons in one day. Orders for blue annealed sheets for shipment to the Emergency Fleet Corporation and other shipbuilding companies are very heavy. The order for about 45,000 tons of painted corrugated sheets placed some time ago by the Government has nearly all been filled, part of the sheets being in France and the remainder will be shipped prior to June 15. Jobbers who send in orders for sheets are now asked by the mills to give the name of the buyer or else to have the buyer make direct application to the sheet mills for the material he wants. Just how the situation as regards the selling of sheets to jobbers will be handled is now being worked out and will be decided in a short time. There is still an acute shortage in supply of sheet bars, and this is keeping down output to some extent. Prices fixed by the Government on sheets in effect until June 30 are given on page 1305.

Tin Plate.—It is estimated that at present the output of tin plate is running about 800,000 base boxes per week, or about 95 per cent of maximum capacity. During the coming hot weather this output will probably fall to 750,000 base boxes per week. In spite of the shortage in steel and often in labor, output of tin plate is keeping up remarkably well, largely due to the combined efforts of the tin plate mills to turn out every pound of tin plate this year possible. The tin plate manufacturers fully expect to meet the enormous demands to be made on them for tin plate during the coming six months for food containers, and also to meet any other extraordinary demands. The consumers are nearly all covered for their needs for last half of the year, the price being left open, and will be whatever price the War Industries Board may fix late in June, when it will fix prices on steel products for third quarter. At that time the price on tin plate will be fixed for last half of this year, and it is possible there may be a slight advance due to the very high price ruling for pig tin, but nothing official on this is known. We quote tin plate at \$7.75 per base box, up to June 30, rolled from Bessemer or open-hearth steel, f.o.b. Pittsburgh. The demand for terne plate is very quiet; in fact, manufacturers are paying as little atten-

tion to it as they can. Prices on terne plate are given on page 1305.

Cotton Ties.—Makers of cotton ties are busy filling contracts for shipments during this month and June and are not accepting any orders for shipments starting July 1 and will not until the War Industries Board has acted on steel prices for third quarter delivery.

We quote cotton ties at \$1.90 per bundle of 45 lb. for lots of 3000 bundles and over. For lots of 1000 bundles and up to, but not including, 3000 bundles, \$1.92 per bundle, f.o.b. Pittsburgh. These prices are for April shipment, while for May 1c. additional carrying charge is made, and 2c. for June.

Wire Rods.—Concerns that heretofore have been able to get rods fairly promptly to go into the manufacture of other than war essentials now find that the mills are refusing to accept their orders unless they can show priority certificate or give the Government number order for which the rods are wanted. Two local makers of rods state they are absolutely out of the market and have none to sell over the next two to three months. The output of rods in the Pittsburgh district for some months has not been over 50 per cent of capacity, due to the shortage of steel. There are some export inquiries in the market, mostly from Canada, but mills are not quoting. Prices on rods, in effect until June 30, are given on page 1305.

Wire Products.—As yet the expected order for 47,000 kegs of wire nails for the army, bids for which were opened on April 27, has not been placed. Every day local mills are turning down orders from desirable customers they formerly furnished with nails, stating that under their pledge they will give 100 per cent of their output of nails and wire to the Government as long as required. Once in a while, a favored customer may be able to obtain a few nails or a small quantity of wire, if the mill feels it is politic to fill the order. Some fairly large orders for barb wire have been placed lately by Italy for shipment into France, and there is some inquiry in the market for what is known as spiral wire to be used in winding columns for fire-proofing purposes for the new Government warehouse being built in Brooklyn. Reports are the Railroad Administration has an inquiry out for 16,000 to 18,000 kegs of wire nails to be used in building the wooden cars involved in the contracts lately placed by the Government. Stocks of wire and wire nails held by jobbers are very light and on sizes or nails not largely used stocks of some jobbers are nearly depleted. Two local mills say they are refusing absolutely to accept any new business in nails or wire except for the Government on direct or indirect orders. The Government price on cut nails for this quarter is \$4 base, per keg, f.o.b. Pittsburgh. Prices on wire and wire nails are given on page 1305.

Spikes.—The demand for railroad spikes has been light for some time. The Baltimore & Ohio and the Lackawanna railroads recently bought 2000 kegs or more each. The demand for small spikes and for boat spikes is very heavy and makers are filled up on these for four or five months ahead.

Standard sizes of railroad spikes 9/16 x 4 1/2 in. and larger \$3.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes, \$5.25 per 100 lb., track bolts, \$4.90 base in lots of 200 kegs or more; less than 200 keg lots, \$1 per 100 lb. extra. All f.o.b. Pittsburgh.

Hot-Rolled Strip Steel.—The demand for hot-rolled strip steel for the past two weeks has been very much heavier, and mills are operating to a greater rate of capacity, 75 per cent or more. A greater part of the output is being taken by the Government on direct or indirect orders, and quotation less than the Government price made recently by a few makers has been withdrawn and the market is very firm. The Government maximum price is \$4.50 per 100 pounds f.o.b. Pittsburgh, for second quarter delivery.

Cold-Rolled Strip Steel.—Makers of cold-rolled strip steel have pledged themselves to give their entire output to the Government as long as needed, but it is not likely the Government will take more than a part of the output so that commercial users will still be able to place their orders with the mills. The demand for cold-rolled strip steel is heavy, and mills are operating now very close to capacity, except with the

shortage in supply of steel which occurs frequently. Several local makers are shipping a large part of their output of cold rolled strip steel to the Government on direct and indirect orders. Government prices for second quarter are very firm.

We quote cold-rolled strip steel at \$6.50 per 100 lb., f.o.b. Pittsburgh, terms 30 days, less 2 per cent cash in 10 days, when sold in quantities of 300 lb. or more.

Shafting.—Very large orders for shafting are being placed by the Government, and probably 90 per cent or more of the entire output is being used in the manufacture of war essentials, and a large quantity is being used for making detonators, time fuses, etc. New inquiries from the Government are in the market, and will be allocated to the makers in a short time. The mills making cold-rolled shafting are operating at 75 per cent or more of capacity, and have very little material for the commercial demand. New business from the automobile and screw stock machine trade is very quiet. Government discounts on cold rolled shafting are 17 per cent off in carloads and 12 per cent in less than carloads, f.o.b. Pittsburgh.

Nuts and Bolts.—Under the recent pledge, makers of nuts and bolts are giving 100 per cent of their output to the Government on direct and indirect orders, and will do so as long as the material is needed. Recently very heavy Government orders for nuts and bolts were placed, and very quick deliveries are being made. Stocks held by the mills have been largely depleted on account of rush orders being filled mostly from these stocks. Makers report prices very firm, and say that regular Government discounts are being absolutely maintained. These discounts in effect for this quarter are given on page 1305.

Rivets.—The direct and indirect Government demand for rivets is heavy, and is taking 90 per cent or more of the output. Stocks held by jobbers are low, and they will probably be unable to place orders with the makers unless they can show the material is wanted for war essentials. The commercial demand for some time has been limited. Government prices for second quarter are \$4.65 for structural rivets and \$4.75 for cone-head boiler rivets per 100 lb. f.o.b. Pittsburgh.

Skelp.—None of the mills rolling iron and steel skelp has any material to offer for delivery under four months. The shortage in supply of steel is cutting down output to some extent.

We quote grooved skelp at \$2.90; universal skelp, \$3.15, and sheared skelp, \$3.25 base. Special skelp for boiler tubes, etc., is \$3.40 for base sizes and \$3.55 for other sizes, all prices being per 100 lb., f.o.b. Pittsburgh.

Hoops and Bands.—Nearly the entire output of both hoops and bands is now going to the Government on direct or indirect orders, and the demand for hoops for cooperage purposes is very heavy. The Government is buying very large quantities of turpentine, rosin and other similar materials, and is creating a heavy demand for steel hoops for containers for these products. Prices on steel hoops for cooperage purposes are \$3.50 and steel bands \$2.90 per 100 lb., f.o.b. Pittsburgh. Extras on the latter as per the steel bar card.

Wrought Pipe.—Reports are that a great deal of Government work is under way in the West and South in the laying of new oil lines and establishing new shipping stations for crude oil that is taking very large quantities of 4, 6 and 8-in. pipe. The Government is also a fairly large buyer of iron and steel pipe for other constructive purposes, both in this country and France. The commercial demand is fairly heavy and on lap-weld pipe mills are sold up for some months. On some sizes of butt-weld, a few mills can make deliveries in eight to 12 weeks from date of order. Discounts on iron and steel pipe in effect for this quarter are given on page 1305.

Boiler Tubes.—Indications are that the entire output of the mills making iron and steel tubes will be taken by the Government for some months. In fact, for a long time the output of the larger makers of iron and steel tubes has been going to the Government on direct and indirect orders, and this is also true of seamless steel tubing. The two local makers of this

ter product are sold up for a year or more, nearly entirely on Government orders. Discounts on iron and steel tubes for this quarter are given on page 1305.

Coke.—Last week the car supply in the coke regions was the best at any time since last fall, averaging about 100 per cent nearly the entire week. However, output of coke fell off some, due to several holidays on which the men at some of the plants did not show up for work. Preference is still being given in supply of cars for coke loading on the Monongahela connecting railroad, and this is helping out very much in the distribution of coke to blast furnaces. There is now very little complaint from blast furnaces about receipt of coke, which is again nearly normal, but which on some days runs short. The outlook is so good for a full supply of coke that within the past week the Carnegie Steel Co. has started three more blast furnaces. There is a ready market for all the coke as fast as it is made, and there is practically no free coke. The *Connellsville Courier* gives the output in the Upper and Lower Connellsville regions for the week ending May 4 as 333,455 tons, a decrease from the previous week of 10,410 tons. Prices on coke for this quarter are \$6 for 48-hr. blast furnace, \$7 for 72-hr. foundry and \$7.35 for crushed coke from 1-in. size, all in net tons at oven.

Old Material.—There is a fairly active demand for heavy melting steel and some other grades. Some mills are paying commissions and others are not.

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	\$28.50 to \$29.00
No. 1 cast scrap (for steel plants)	28.50 to 29.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh	33.00 to 34.00
Hydraulic compressed steel scrap	26.00 to 27.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	24.00 to 25.00
Bundled sheet stamping scrap	22.00 to 23.00
No. 1 railroad malleable scrap	28.00 to 29.00
Railroad grate bars	18.00 to 19.00
Low phosphorus melting stock (un-guaranteed)	34.00
Low phosphorus melting stock (guaranteed)	36.50
Low phosphorus melting stock (bloom and billets ends, heavy plates)	39.00
Iron car axles	46.00 to 46.50
Locomotive axles, steel	46.00 to 46.50
Steel car axles	46.00 to 46.50
No. 1 busheling scrap	26.00 to 27.00
Machine shop turnings	18.00 to 19.00
Cast iron wheels	28.00 to 29.00
Rolled steel wheels	34.00 to 36.00
Sheet bar crop ends (at origin)	34.00 to 35.00
Cast iron borings	18.50 to 19.00
No. 1 railroad wrought scrap	33.00 to 34.00
Heavy steel axle turnings	23.00 to 24.00
Heavy breakable cast scrap	28.00 to 29.00

The Pittsburgh office of Manning, Maxwell & Moore, Inc., has received a contract for 15 Shaw electric traveling cranes ranging from 5 to 75 tons' capacity each, to be installed in the new plant of the Chickasaw Shipbuilding Co., at Mobile, Ala., this being a subsidiary of the Tennessee Coal, Iron & Railroad Co. The Pittsburgh office has also secured a contract for a 200-ton Shaw electric traveling crane for the new erection shop being built by the Louisville & Nashville Railroad at South St. Louis. Also one 10-ton and one 20-ton Shaw cranes for an addition to the forging plant of the Carbon Steel Co., at Pittsburgh, two 10-ton Shaw cranes for the Union Steel Castings Co., Pittsburgh, and one 7½-ton Shaw crane for the Pittsburgh-Des Moines Steel Co., whose plant is on Neville Island, Pittsburgh.

The 18-in. bar mill of the Franklin Steel Works, at Franklin, Pa., which was closed down for some time to allow it to be equipped with new mill tables, is again in operation. These mill tables were built by the Du Bois Iron Works, Du Bois, Pa.

The offices of the Reliance Machinery Sales Co. have been removed to 717 Bessemer Building, Pittsburgh.

Chicago

CHICAGO, May 13 (By Wire).

Specifications for the huge quantities of material which will be needed in the construction of 100,000 freight cars to be built for the Government have not been placed, although it is believed action is near. What seems to be delay when need is pressing is not surprising in view of perplexing questions as to what materials shall be favored and where they shall be obtained when selected. There are those who say that enough plates cannot be had and that resort must be had to wood as a substitute. It was originally figured that about 55,000 of the cars would have steel wheels, but because of scarcity of steel this is a matter of doubt. Some decision at Washington is expected tomorrow as to how many of 800,000 wheels will be steel and how many iron. Then there is the matter of trucks. Makers of bar iron, who have not shared as fully as the steel makers in war work, hope that trucks of arch-bar type will be used, thus conserving steel and giving them more to do, a proposition regarded by many with favor.

The question of keeping iron and steel jobbers upon the active list is a live one. So far as those in this district are concerned, it is authoritatively stated that they have not been guilty of profiteering and that they have "come through clean."

Pig Iron.—Producing interests have no comment to make upon the meeting held at Cleveland last week as the initial step in Government control of pig iron similar to that exercised in steel and steel products, except that the producers will give the Government any and all the figures or information it wants. Inquiry has slackened and not much is being done. The wants of smaller consumers who are regular customers are being cared for as they make known their last half requirements, the larger consumers being covered for the most part. Some prompt low grade iron continues to be sold, and occasionally some of a better grade when, for one reason or another, a buyer desires not to accept a shipment. Deliveries of both Northern and Southern iron are proceeding at a satisfactory rate, about the only trouble being in cases where melters have not allowed sufficient time for iron in transit.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$37.50
Lake Superior charcoal, No. 6 and Scotch	40.00
Northern coke foundry, No. 1	32.50
Northern coke foundry, No. 2	33.00
Northern coke foundry, No. 3	32.50
Northern high-phosphorus foundry	33.00
Southern coke No. 1 foundry and No. 1 soft	38.50
Southern coke No. 2 foundry	37.00
Malleable	33.50
Basic	32.00
Low phosphorus (copper free)	53.00
Silvery, 7 per cent	44.54

Ferroalloys.—The demand for ferromanganese in this market appears to have lessened. Eighty per cent has been sold on the basis of \$250 for 70 per cent, plus \$4 per unit for excess manganese, or \$290, but offerings of 80 per cent at this price are still to be taken.

Plates.—Considering the huge demands for shipbuilding and cars, there is no chance for consumers to buy unless they hold priority certificates. With the car business once out of way, it is felt that some ease may develop in plates of tank quality, especially those classed as such, but which are discards from ship plates. Meanwhile the Government shipbuilding agencies are specifying steadily.

Bars.—In view of the difficulty in getting steel, the attention of the Railroad Administration has been directed to the possibility of conserving steel by the use of arch-bar trucks in the manufacture of 100,000 freight cars which are to be built by the Government. Should this be done, it will mean activity for the bar iron mills whose share of war business has not been notable. There is some demand, but not much, for concrete rein-

forcing rods. Mild steel bars are obtained only on priority orders. We quote: Iron bars, 3.50c. Chicago; mild steel, 2.90c., Chicago or Pittsburgh, and high carbon bars at 3c., Chicago, these being Government maximums. Jobbers quote:

Soft steel bars, 4.10c.; bar iron, 4.10c.; reinforcing bars, 4.10c., base, with 5c. extra for twisting sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting, list plus 10 per cent.

Structural Material.—Specifications for the material which will be required to build the 100,000 cars to be constructed for the Government have not been placed, the delay being attributed to questions as to what kind of material shall be used and where it shall be obtained. The plate question alone is a problem, while also to be considered is iron arch-bar or cast-steel trucks and iron or steel wheels. Action is believed to be but a matter of hours. The Kansas City Structural Steel Co. will fabricate 126 tons for a repair shop for the Bingham & Garfield Railway Co., Magna, Utah, and an unknown bidder will supply 169 tons for a building to be erected for the Wells Fargo Express Co., Chicago. These comprise the structural jobs. The mill quotation is 3c., Chicago and Pittsburgh, with the official jobbing price 4.25c. for material out of warehouse.

Sheets.—At a meeting of sheet makers in Pittsburgh last week, the suggestion was made that the Government select a number of jobbers who would be authorized to carry stocks from which small lots intended for Government use could be drawn, a Government official supervising the distribution. How this would work out is a question inasmuch as every jobber would want to be in the selected group. The jobbers incidentally can get some sheets, but little else. Priority orders govern the makers generally. We quote No. 28 black at 5c., No. 28 galvanized at 6.25c. and No. 10 blue annealed at 4.25c., all Pittsburgh.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.45c.; No. 28 black, 6.45c., and No. 28 galvanized, 7.70c.

Wire Products.—Nothing new in the situation is to be noted, although the heavy demand for barbed wire may be reiterated. Nails also are wanted in heavy quantities. We quote:

Nails, \$3.50. Pittsburgh; plain fence wire, \$3.25; painted barb wire, \$3.65; galvanized barb wire, \$4.35; polished staples, \$3.65, and galvanized staples, \$4.35.

Bolts and Nuts.—Orders are numerous and the mills are working at full speed, with the prospect of lessened activity when present stocks of raw material are exhausted. For prices and freight rates see finished iron and steel, f.o.b., Pittsburgh, Page 1305. Jobbers quote:

Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to $\frac{1}{2}$ in. 40 and 10 per cent off; larger sizes, 35 and 5 off; carriage bolts up to $\frac{1}{2}$ in. 40 and 2 $\frac{1}{2}$ off; larger sizes, 30 and 5 off; hot pressed nuts, square tapped, \$1.05 off, and hexagon tapped, 85c. off per 100 lb.; coach or lag screws, gimlet points, square heads, 50 per cent off.

Rails and Track Supplies.—Track bolts and spikes are to be had, but they are not wanted in heavy volume because the railroads cannot get rails. We quote:

Standard railroad spikes, 4.11 $\frac{1}{2}$ c., Chicago. Track bolts, with square nuts, 5.11 $\frac{1}{2}$ c., Chicago. Tie plates, steel, 3.25c.; tie plates, iron, 3.75c.; f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill for 25 to 45-lb. sections, lighter sections taking Government extras.

Cast Iron Pipe.—How slow this trade is can be deduced from the fact that but one small letting is in prospect. Kansas City, Kansas, will take bids tomorrow on 320 tons. The pipe shops have routine and general work in hand, but not a great deal.

Quotations per net ton, Chicago, are as follows: Water pipe, 4-in., \$57.30; 6-in. and larger, \$54.30, with \$1 extra for Class A water pipe and gas pipe.

Old Material.—It is declared that present conditions do not afford a sufficient incentive for the maximum gathering of country scrap and this has given rise to conjecture as to the consequent effects which may be felt next winter. Local mills have taken some rolling mill grades, and the maximum has been paid for heavy melting steel, but the market as a whole cannot be called active. Lists have been issued by the C. M. and St. P., the Soo Line and the C. and G. W.

All are small, the first named road offering 500 tons of cast among other items.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton
Old iron rails
Relaying rails
Old carwheels
Old steel rails, rerolling
Old steel rails, less than 3 ft.
Heavy melting steel.....
Frogs, switches and guards, cut apart.....
Shoveling steel
Steel axle turnings.....

Per Net Ton
Iron angles and splice bars.....
Iron arch bars and transoms.....
Steel angle bars
Iron car axles
Steel car axles
No. 1 railroad wrought.....
No. 2 railroad wrought.....
Cut forge
Pipes and flues.....
No. 1 busheling
No. 2 busheling
Steel knuckles and couplers.....
Coil springs
No. 1 boilers, cut to sheets and rings.....
Boiler punchings
Locomotive tires, smooth.....
Machine-shop turnings
Cast borings
No. 1 cast scrap
Stove plate and light cast scrap.....
Grate bars
Brake shoes
Railroad malleable
Agricultural malleable
Country mixed scrap.....

Birmingham

BIRMINGHAM, ALA., May 13.

Pig Iron.—There is not a Birmingham district iron master who is not guarding unsold capacity jealously and for two reasons, first to protect regular customers and, secondly on account of apprehension on the part of some makers that labor and other conditions may not permit manufacturing at capacity. Lifting of embargoes in the Middle West and East has enabled shipment on past-due orders. Some of the movement to the East is going by South Atlantic ports, some ship room having been obtained. Yard accumulations decreased around 35,000 tons in April, stocks showing slightly over 210,000 tons on May 1. Of this almost a half, it is understood, is basic iron not on the general market. May movements continue heavy and there will be another very substantial reduction. If the reduction maintains its present pace during the summer, autumn will find precious little metal in yards, and that seems a fair forecast. The output is still behind that of 1917 owing principally to shortage of coke, especially on the part of one company, which is frequently forced to bank fires in at least one furnace. The April output in Alabama was 208,000 tons compared with 245,000 in May of 1917 and the production of the first four months of the year is 864,000 tons compared with 976,000 in 1917, a decrease of 112,000. There is a pronounced scarcity of soft iron. A stock of several thousand tons of No. 4 is under negotiation. We quote per gross ton f.o.b. Birmingham as follows:

No. 2 foundry and soft.....	\$33.00
Basic	32.00

Cast-Iron Pipe.—Fill-in orders from municipalities in the southwest were more numerous during the week and Government contracts for cantonments were placed. Sanitary as well as water pipe concerns shared the business.

Coal and Coke.—Interest centers in the plans of the Sloss-Sheffield Steel & Iron Co. to build by-product coke ovens, which are reported as depending on permission from the Government to secure certain materials needed. Early announcement one way or the other is expected. The coal output is increasing with warm weather. There is no complaint as to cars either for coal or coke. The demand for coke exceeds the supply.

Old Material.—The scrap market is without feature. The consumption in the south is large and very little outside of wrought is going out of the State. Steel scrap is active. Supply and demand are about equal and there are no price changes. We quote per gross ton f.o.b. Birmingham district yards prices to consumers as follows:

Old steel axles.....	\$32.00 to \$33.00
Old steel rails.....	27.00 to 27.50
Heavy melting steel.....	25.50 to 26.00
No. 1 railroad wrought.....	31.00 to 32.00
No. 1 cast.....	27.00 to 27.50
Old carwheels.....	28.00 to 29.00
Tramcar wheels.....	21.00 to 25.00
Machine shop turnings.....	15.00 to 16.00
Cast iron borings.....	15.00 to 16.00
Stove plate	23.00 to 24.00

British Steel Market

American Semi-Finished Steel Unobtainable— Tin Plate Buying Difficult

(By Cable)

Pig iron conditions are improving slightly. American semi-finished steel is unobtainable. Buying of tin plate is rather difficult, with the maximum basis price now 33s. 4½d. Ferromanganese is firm, with up to \$260 c.i.f. paid for summer shipment to North America. We quote as follows:

Tin plates coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 33s. 4½d.
Ferromanganese, \$250 to \$260, c.i.f. for export to America; £26 10s. for British consumption.
Ferrosilicon, 50 per cent, c.i.f. £35 upward.
On other products control prices per gross ton are:
Hematite pig iron, East Coast, £6 2s. 6d.; West Coast, £6 7s. 6d.
Cleveland pig iron, £4 15s. to £4 19s.
Steel plates, ship, bridge and tank, £11 10s.
Steel sheets, black plate, all open annealed, produced in sheet mills, £16 to £18.
Bar iron, standard quality, £13 17s. 6d.; marked, £16.
Sheet and tin plate bars, £10 7s. 6d.
Blooms and billets for rerolling (ordinary), £10 7s. 6d.; special quality, £11.

No Demand for American Steel—Tin Plate Firmer—Heavy Demand for Ship Steel

(By Mail)

LONDON, ENGLAND, April 16.—Little change is discernible, and unfortunately so far no indication of any amelioration. There is not much fault to be found with the progress of the pig-iron output, although in some districts it is still short of the current heavy needs. In view of the prevailing restrictions, which tend to force trade more and more into controlled channels at stipulated prices, the result of the Birmingham quarterly meeting about to take place is not expected to disclose any special features.

Conditions in pig iron are unchanged except for the more acute tension among consumers, especially in the north, owing to the delayed deliveries. Cleveland foundry iron is accumulating in private yards, but it is now understood that a considerable supply of cars is to be released, especially for moving iron to Scotland. Owing to extensive cancellations at the end of March, due to non-delivery, applications for the current month have been granted on a larger scale. There is plenty of iron available. On the export side, shipments to France are making fair headway, but Italy is suffering from inadequate tonnage, while orders already under license are much in arrears. The fact that hematite makers have a little more stock in their hands is chiefly the outcome of the postponed deliveries due to car shortage, but the demand is greater than ever, although steel works' operations are assisted by the use of basic iron. The total exports of iron from the Tees last month were barely 26,000 tons.

There is nothing new in semi-finished steel, the trade still discussing the prospects of a revision of the official price of Welsh sheet bars and billets, which, at £10 7s. 6d., is considered too low owing to accumulated costs in the last two years, but there is no indication yet of this matter being seriously looked into by the authorities. Trading in American material is absolutely dead, c.i.f. offers being entirely in abeyance, and

prices are nominal. The great bulk of the home output is for national work, and the market thus continues stringent, while the supply of shell discard billets is limited.

The pressure in the finished iron and steel sections is still pronounced, chiefly because of the phenomenal accumulation of orders. War requirements are well protected, while it is even suggested that rather more steel should eventually become available for mercantile purposes, as there are cases where makers seem in a somewhat better position to entertain additional orders for the merchant trade. Should this develop the restrictions upon export business might be relaxed a little, and thus allow of urgent Allied needs being taken into consideration.

The home maxima have undergone no further change and market conditions are colorless except for the hardening tendency of uncontrolled material. No decision has yet been made for taking gas strip under control. Bar iron makers are virtually flooded with orders and new bookings are restricted. Heavy deliveries of shipbuilding material are being made, while the shipyards are pushing their operations and calling for a much heavier supply of ship plates and other requisites.

A firmer feeling pervades the tin plate trade, chiefly as a result of another good French order for 70,000 basis boxes for April delivery on the usual full terms, and this has enabled most of the works that were in need of orders to complete their books over that period. The tone in primes is steadier, though here and there additional work is still wanted so that the maximum rate is still being shaded fractionally. Oil plates remain quiet, although an order was recently placed for export at the comparatively low figure of about 31s. for quarters. The maximum basis 20 by 14 has hardly varied for a few weeks past, although it was raised to-day from 31s. 10½d. to 32c. Wasters are comparatively scarce and firmly held. Operations at mills continue satisfactory, while the deliveries of steel bars are regular.

Ferromanganese continues quiet, business with the Continent being difficult owing to the delays in securing licenses, and prices are kept in the neighborhood of £60 f.o.b. for loose, while terms for North American Atlantic ports for forward shipment stand at about \$250, at which some further business has been done for Canada.

St. Louis

ST. LOUIS, May 13, 1918.

Pig Iron.—Taking heart from the hope that the Government's use of pig iron will be directed chiefly to basic iron and not so much toward foundry grades, the consuming interests in this territory are hopeful that they will be able to make purchases of needed material after the first flurry is over. However, the furnace representatives are not offering any iron of any character, even of the odd lots of off iron. Inquiries for basic previously reported remain unfilled. Representatives of furnaces are looking more toward traffic matters and report deliveries under previous contracts steadily improving, though not yet up to needs or terms of deals.

Coke.—No business appeared in coke during the week save for a little trading among possessors of a little extra supply with their less fortunate brethren. However, there is and can be very little of this, as there is no available supply of coke in any yard that could not be well used by its owner. By-product as well as bee-hive coke continues completely out of the market.

Finished Iron and Steel.—The mills deliveries on all kinds of finished steel in the classes required for Government use are practically nil except in the case of plants which have Government work and therefore get priority orders. No business is being booked and the chief efforts are still directed to making the best of the current situation which has been described many times heretofore. The warehouses are suffering from the slow deliveries from the mills and therefore are not giving all the satisfaction desirable, though it is

recognized that they are doing their best. We quote for stock out of warehouse as follows: Soft steel bars, 4.17c.; iron bars, 4.17c.; structural material, 4.27c.; tank plates, 4.52c.; No. 8 sheets, 5.47c.; No. 10 blue annealed sheets, 5.52c.; No. 28 black sheets, cold rolled, one pass, 6.52c.; No. 28 galvanized sheets, black sheet gauge, 7.77c.

Old Material.—Dealers are still rather quiet in their operations in the market, not yet being assured of what the future has in store. The prices which have prevailed have very generally been below the Government figures and in consequence the commission ruling is still without much effect on the situation. Dealers who are able to hold their material, however, are of the opinion that before very long all the material that can be found will be in demand as a result of the blast furnace inability to meet all the demands of the country and so are making no effort to move scrap which they have bought at a favorable price. The local roads continue to make small offerings from day to day of railroad scrap of various classes, but no large lists are appearing. Much the same difficulty which has prevailed in the past in getting cars is also reported when occasion comes to move old material. Local industries continue to operate on the supplies in their yards and under contract, causing the local demand to be rather light except for some specific needs of small quantities. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district as follows:

Per Gross Ton

Old iron rails.....	\$36.50 to \$37.00
Old steel rails, rerolling.....	33.50 to 34.00
Old steel rails, less than 3 ft.....	31.00 to 31.50
Relaying rails, standard sections, subject to inspection	60.00 to 65.00
Old carwheels	28.50 to 29.00
No. 1 railroad heavy melting steel scrap	27.50 to 28.00
Heavy shoveling steel.....	26.50 to 27.00
Ordinary shoveling steel.....	26.00 to 26.50
Frogs, switches and guards cut apart.....	28.50 to 29.00
Ordinary bundled sheet scrap.....	23.50 to 24.00
Heavy axle and tire turnings.....	20.50 to 21.00

Per Net Ton

Iron angle bars.....	\$33.00 to \$33.50
Steel angle bars.....	27.00 to 27.50
Iron car axles	40.00 to 40.50
Steel car axles.....	40.00 to 40.50
Wrought arch bars and transoms.....	40.00 to 40.50
No. 1 railroad wrought.....	28.50 to 29.00
No. 2 railroad wrought.....	27.00 to 27.50
Railroad springs	28.50 to 29.00
Steel couplers and knuckles.....	29.50 to 30.00
Locomotive tires, 42 in. and over, smooth inside	36.00 to 36.50
No. 1 dealers' forge.....	26.00 to 26.50
Cast iron borings.....	15.00 to 15.50
No. 1 busheling	24.50 to 25.00
No. 1 boilers, cut to sheets and rings.....	22.00 to 22.50
No. 1 railroad cast scrap.....	25.00 to 25.50
Stove plate and light cast scrap.....	20.00 to 20.50
Railroad malleable	26.50 to 27.00
Agricultural malleable	25.50 to 26.00
Pipes and flues.....	23.00 to 23.50
Heavy railroad sheet and tank scrap.....	22.50 to 23.00
Railroad grate bars.....	20.50 to 21.00
Machine shop turnings.....	16.00 to 16.50
Country mixed scrap.....	19.00 to 19.50
Uncut railroad mixed scrap.....	23.50 to 24.00

San Francisco

SAN FRANCISCO, May 7.

The statement that the Government will use virtually every ton of steel and pig iron in the country caused scarcely a ripple in San Francisco, except among the jobbers and brokers. The latter are somewhat worried, as they do not know just where they stand. The market was nearly entirely Governmental before the recent announcement and they may be put entirely out of business. The jobbers, however, feel that there will be some plan devised which will allow them to continue to keep a stock of the various steel and iron products. These jobbers say that most of this is being sold to the shipbuilders on the Coast, and that the stocks which the jobbers have carried have been of great benefit in aiding shipbuilding, as they were able to supply the small wants of the builders with a minimum loss of time. Efforts are being made in San

Francisco to have modified the embargo on manganese ores which goes into effect May 13. It is pointed out that many ships come to this country comparatively light and these might bring the manganese ore which is so badly needed in some steel producing sections.

Bars.—The use of bars in building concrete ships will doubtless be increased by the successful trip about the Bay made by the new concrete ship Faith on May 5. The trip was a success in every way and it is generally believed that several similar ships will be built immediately. The local mills are taking care of the demand for small bars including the demand for bars for concrete buildings. This latter demand has now ceased almost altogether.

Structural Materials.—There has been no large sized structural material on this market for some time, and if the Government does not recognize the jobbers in taking over the products of the mills, the supply of smaller sizes in the hands of the latter will last but a short time.

Plates.—The jobbers have received a few more carloads of plates but they do not know whether they will be allowed to sell these without a permit from the Government. Some other cars of plates are on the way, but the stock will not last long if provision cannot be made for renewals.

Sheets.—The jobbers say that there have been no sheet mills willing to take orders for the future for the past week or ten days, and that several orders already accepted for future delivery have been canceled. The jobbers have been practically stripped of their stocks, and shipbuilders will suffer on some of their hurry-up needs if some stock is not placed in the jobbers' hands.

Coke.—Where coke is most urgently needed enough is allowed to come in to satisfy immediate demands. There are no accumulations anywhere, however, and some concerns which had a considerable supply a year ago are getting to a point which they say is dangerous.

Scrap.—The market is strong. It is just announced that the Southern Pacific Railroad has sold 13,000 tons of miscellaneous steel scrap to various dealers in the state. This is said to have been the largest single sale of scrap ever made in the State. The sale was made at Government price. Shipments from Mexico have ceased entirely, on account of the Mexican embargo, which is said to be the result of German propaganda. The mills are offering the Government price on heavy melting, but are getting very little. Word has been received by scrap dealers on the Pacific Coast from W. Vernon Phillips, chairman of the Sub-Committee on Iron and Steel Scrap of the American Iron and Steel Institute, that they will be expected to observe strictly the Government maximum prices on old material. It is charged that prices averaging about \$1 per ton over the maximum figures have been gotten by some dealers in this section of the country. We quote as follows:

Heavy melting steel, per gross ton.....	\$29.00
No. 1 cast iron (cupola size).....	34.00
Country mixed scrap, paid by dealers.....	22.00

Philadelphia

PHILADELPHIA, May 14.

There is an appreciable tightening in both the steel and pig iron supply except for urgent Government requirements. The same degree of control which is now being exercised over steel shipments will also apply to pig iron. Shipments of iron are being made at present only to companies which can show that they are engaged in war work, and a further definite working out of shipping schedules will be made when the War Industries Board has completed an iron census, which is being begun this week. Steel companies are observing the 100 per cent pledge with the utmost exactness in most instances, although there is a slightly different interpretation among steel makers as to how the pledge should be carried out. For example, one maker of wire

nails in the Pittsburgh district is operating its wire mills at usual capacity, and if any of the product remains after the Government wants are supplied, it is shipped on old contracts. Another maker of nails, however, is operating its nail department only to the extent necessary for Government orders, and as this is not up to 100 per cent, a considerable tonnage of steel is released for other departments of the works. There has been no disposition to regulate shipments of tool steel, and as this commodity is largely going to machine-tool builders and thus eventually becomes of service in Government work, it is not expected that there will be any attempt by the War Industries Board to regulate shipments. A maker of charcoal iron tubes reports that shipments are not being regulated by the Government as are other steel products. The jobber's position is still critical with respect to supply of steel. J. L. Replogle, director of steel supply for the War Industries Board, received a delegation of jobbers in Washington last week and a plan was worked out whereby jobbers may receive some steel to be applied only on Government work. A steel company has sold a local jobber a small tonnage of plates, shapes and bars with the understanding that this is to be resold only for Government work, and it replaces a similar tonnage of steel which the jobber showed had been sold recently for war work. Some of the smaller Philadelphia jobbers have started a movement to make a pledge to the Government that, if they are furnished with steel, they will not sell except to consumers who can show priority certificates.

Pig Iron.—Now that the distribution of steel has been strictly controlled by the War Industries Board, steps have been taken to place pig iron distribution under the same complete regulation. For the present, blast furnaces will not accept orders nor make shipments of iron except to consumers who can show positively that the iron is to be used for Government work. Whether there will be foundry iron available for non-war work depends upon the results of the census to be taken of the iron industry by the War Industries Board. Questionnaires will be mailed this week from Washington to furnace operators and selling agents seeking information in detail as to the tonnage of iron they expect to be able to produce during the remainder of the year, the amount they have on order, names of consumers who have contracted for iron and amounts they have contracted for, grade of iron, etc. After this information is received in Washington, another set of questionnaires will be sent out which iron producers and their agents will be asked to mail to the consumers with whom they have contracts, and consumers will be required to state the kind of essential work they are doing and the tonnage of iron that they will require for the remainder of the year. It is expected that the Government in this way will be able to determine whether sufficient iron will be available during the remainder of the year for Government work. It is certain that the war requirements will use all of the steel-making iron, there already being a pronounced shortage of basic and low phosphorus. Foundries will be allocated iron in the order of importance of the work they are doing. It is stated that stove makers and manufacturers of sanitary ware, for example, will probably go to the bottom of the list, but there are some producers of iron who believe that there will be enough to go around so that all necessary work, even though it cannot be strictly classified as war work will be taken care of. Other sellers do not share this optimistic view and predict that many foundries will be obliged to go without iron altogether. Much depends on the extent to which production of foundry iron is increased and whether very many furnaces change from foundry grades to basic or low phosphorus as some have recently done. Production of foundry iron in this district in April was about double that of February, and producers look for a further increase. Furnaces that are equipped with chill molds are being urged by the War Industries Board to operate on basic or low phosphorus iron. One of the Warwick furnaces at Pottstown is now on basic exclusively. None of the Bethlehem Steel Co. furnaces at Lebanon is on foundry, all having recently changed over to low phos-

phorus and ferromanganese. One of the Midvale Steel Co. furnaces has also changed to low phosphorus iron. The War Industries Board is much concerned over the shortage of low phosphorus iron for the large gun program, but steps are being taken to increase the supply. A shortage of ore is a principal drawback, and despite the fact that every effort is being made to curtail the use of ships for transporting ore from abroad, it appears quite likely that Spanish low phosphorus ores will be imported in considerable quantity. The Brooke furnace at Birdsboro, Pa., is out for relining. The Lukens Steel Co. has depended upon this furnace for a large part of its basic iron. Other arrangements have been made to supply the Lukens plant, its requirements now being 1000 tons per day. Sales of iron in this market, except by Government allocation, are negligible. We quote standard grades of iron f.o.b. furnace, except Virginia iron, for which delivered prices are quoted:

Eastern Pennsylvania No. 1 X.....	\$34.50
Eastern Pennsylvania No. 2 X.....	33.50
Eastern Pennsylvania No. 2 foundry.....	33.00
Virginia No. 2 X (including freight).....	36.77
Virginia No. 2 foundry (including freight).....	36.27
Basic	32.00
Gray forge	32.00
Bessemer	35.20
Standard low phosphorus	53.00
Low phosphorus (copper bearing).....	50.00

Coke.—Shipments of blast furnace coke to this district show a steady improvement, very little complaint now being heard. We quote 48-hr. blast furnace coke at \$6 and 72-hr. foundry coke at \$7, Connellsburg ovens.

Ferroalloys.—Ferromanganese remains firm at \$250, delivered, for the 70 per cent, while spiegeleisen is nominally quoted at \$75, f.o.b. furnace, although it probably would be difficult to buy at that price for nearby delivery. A sale of a carload is noted at \$76.50, furnace. It is stated that the results of the meeting in Pittsburgh last week will be beneficial in educating consumers of ferromanganese and spiegeleisen to the use of the standards now generally employed by sellers, 16 per cent for spiegeleisen and 70 per cent for ferromanganese.

Billets and Slabs.—The only shipments of billets or slabs from steel plants are on allocation by the Government. We quote 4 x 4-in. open-hearth rerolling billets at \$47.50 Pittsburgh, or \$50.50 Philadelphia.

Structural Material.—Shapes for ships and for Government buildings or for additions to plants engaged on Government work are to a great extent using the full capacity of shape mills. Leading producers are requiring their customers to procure priority certificates from Washington so that they can show 100 per cent records. Mills which have not sufficient orders on their books to roll 100 per cent for the Government are reporting their unfilled capacity to Washington and usually receive additional orders that keep them busy. We quote plain material at 3c. Pittsburgh.

Plates.—A steady stream of Government orders for ship plates is being received by plate mills in this district. Production is at a high point. Orders for plates for locomotives have been given to Eastern mills, but orders for the 100,000 cars ordered by the Railroad Administration have not been awarded, though they were expected last week. It is said that arrangements may be made to roll at least a part of the car plates from Bessemer steel. At the Hog Island shipyard 19 keels have been laid for ships, but fabricated material is not yet being received in sufficient quantities for rapid production. Charles M. Schwab, director general of the Emergency Fleet Corporation, has stated in an interview that the steel situation at shipyards is rapidly rounding itself into shape. He added: "The mills in a short time will be turning out more steel than the fabricating plants can handle. Hog Island has had more than 80,000 tons of steel, but the fabricating shops doing its work have been unable to fabricate it rapidly enough. When fabricating shops get going at full speed, all talk of shortages will have disappeared." We quote plates at 3.25c., Pittsburgh.

Old Material.—Most of the scrap dealers in this market have booked considerable tonnages within the past few weeks and they are now busily engaged trying to buy scrap with which to fill these orders. Consumers seem to have fair-sized stocks on hand or have covered for nearby requirements and new inquiry is not exceptionally large, but there is a ready market for whatever scrap is produced. Cast scrap is scarce, particularly in cupola sizes. A foundry in the New York district has been trying to buy in this market. Railroad wrought scrap is scarce and car wheels are almost unobtainable. The monthly list of the Pennsylvania Railroad did not contain any wrought scrap, which seems to indicate that this road is shipping all of its wrought scrap direct to consumers on its lines. Some of the large eastern Pennsylvania consumers of steel scrap will pay the maximum price, \$29, but at present are not offering the maximum plus the commission. When their needs become acute they will undoubtedly be obliged to pay the commission, as dealers are not disposed to sell without it. For many grades of scrap, the maximum prices plus the commission are being freely paid. The Sub-Committee of Iron and Steel Scrap of the American Iron and Steel Institute held a meeting here last week and discussed a number of matters, among them the request of certain foundries that the maximum price for No. 1 cast in cupola sizes be reduced. It was recommended that no changes be made in scrap prices at the present time, the disposition of the committee being to retain the present schedule, which is working without a serious hitch, until the time comes for consideration of the price schedule for third quarter. A discussion of the suggestion that shell turnings be definitely classified as low phosphorus material resulted in opposition to this, as it was felt that changes should not be made now which would have a tendency to increase prices. Although it is yet too early to predict with any degree of certainty what action will be taken on scrap prices for third quarter, it was the sentiment of the sub-committee that prices are high enough, and if there is any change for third quarter it will undoubtedly be downward. Without question there would be serious opposition from dealers to decreases on the ground that as scrap is not moving as freely as it should under the present schedule, any lowering of prices would result in a greater scarcity. We quote as follows for delivery at consumers' yard in the eastern Pennsylvania district:

No. 1 heavy melting steel.....	\$29.00
Steel rails, rerolling.....	34.00
No. 1 low phosphorus heavy, 0.04 and under..	39.00
Low phosphorus, 0.04 and under.....	36.50
Low phosphorus (not guaranteed)....	\$32.00 to 34.00
Old iron rails.....	39.00
Old carwheels.....	29.00
No. 1 railroad wrought.....	34.00
No. 1 yard wrought.....	33.00
Country yard wrought.....	29.00
No. 1 forge fire.....	26.00 to 27.00
Bundled skeleton.....	26.00 to 27.00
No. 1 busheling.....	31.00
No. 2 busheling.....	17.00 to 18.00
Turnings (for blast furnace use)....	17.50 to 18.00
Machine shop turnings (for rolling mill use).....	18.50 to 19.00
Cast borings (for blast furnace use). 17.50 to 18.00	
Cast borings (clean).....	19.00
No. 1 cast (for steel plant use).....	29.00
No. 1 cast (cupola sizes).....	33.00 to 34.00
Grate bars.....	24.00
Stove plate	24.00 to 25.00
Railroad malleable (for steel plants).....	28.00 to 29.00
Railroad malleable (for malleable works)	31.00 to 32.00
Wrought iron and soft steel pipes and tubes (new specifications).....	33.00
Ungraded pipe	29.00

Sheets.—Sheet mills report that they have not sufficient Government orders to work at 100 per cent capacity for any great length of time. At present, consumers with A1 priority certificates can get deliveries from leading producers in about two weeks. Those having higher priority numbers must wait a longer time. We quote No. 10 blue annealed sheets at 4.25c.; No. 28 black at 5c., and No. 28 galvanized at 6.25c., Pittsburgh.

Iron and Steel Bars.—Under the 100 per cent Gov-

ernment pledge, steel bars are unobtainable by commercial users, but there are no restrictions upon sales of bar iron, and hence the demand for bar iron has increased. Many rolling mills are unable to accept the orders offered to them because of difficulties in producing and shipping the iron they already have under contract. The embargoes on railroads are seriously interfering with shipments. Considerable new business is expected from the Railroad Administration as a result of the placing of orders for cars and locomotives. We quote bar iron at 3.685c. and quotations are reported to be firmly on that basis. Steel bars are 2.90c., Pittsburgh, but no business is being taken.

Buffalo

BUFFALO, May 13.

Pig Iron.—Although the ratio of production continues to show a slight increase owing to more favorable coke and transportation conditions, furnaces are not in position to take on any new business and current product will not be sufficient to permit further contracting for commercial uses or anything aside from caring for Government needs. Reports from producers indicate that the Government is taking a more and more definite stand in the matter of regulating deliveries to provide for priority war specification and that the time is not far away when a stricter Government supervision of shipments will be enforced. Many melters engaged on other than Government requirement work are becoming alarmed, as the shortage of iron for commercial uses continues and are endeavoring to secure promise of a place on producers' books after shipments on priority orders have been cleared away. Numerous inquiries for both large and small tonnages have to be turned down flatly by furnacemen because of lack of iron uncontracted for. Stack A of the Donner Steel Co.'s Tonawanda plant now running on foundry iron is soon to be placed on ferromanganese. The current price schedule is as follows, f.o.b. furnace, Buffalo:

No. 1 foundry, 2.75 to 3.25 silicon.....	\$34.50
No. 2 X, 2.25 to 2.75 silicon.....	33.50
No. 3 foundry, 1.75 to 2.25 silicon.....	32.50
Gray forge	32.00
Malleable	33.50
Basic	32.00
Lake Superior charcoal, regular grades, f.o.b. Buffalo	37.50

Old Material.—The special feature of the week has been the large demand which has developed for low phosphorus scrap and machine shop turnings, although the market has been strong and the demand good for most all classes of scrap, with inquiry for heavy melting steel second only to that for the two commodities first mentioned, and all of it produced here going to consumers in this district. Dealers are commencing to calculate the effect the increase in freight rates, which is expected to take place before long, will have upon their trade, and it is recognized it will have an important bearing. Price schedules remain unchanged from last week, and are as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$29.00
No. 1 low phosphorus, heavy, 0.04 and under..	39.00
Low phosphorus, 0.04 and under.....	36.50
Low phosphorus, not guaranteed.....	34.00
No. 1 railroad wrought.....	34.00
No. 1 railroad and machinery cast.....	34.00
Iron axles	\$44.00 to 46.00
Steel axles	44.00 to 46.00
Carwheels	29.00
Railroad malleable	34.00
Machine shop turnings.....	17.00 to 17.50
Heavy axle turnings.....	24.00
Clean cast borings.....	18.00 to 19.00
Iron rails	36.00 to 37.00
Locomotive grate bars.....	24.50 to 25.00
Stove plate	24.50 to 25.00
Wrought pipe	27.00 to 28.00
No. 1 busheling scrap.....	29.00 to 30.00
No. 2 busheling scrap.....	21.00 to 23.00
Bundled sheet stamping scrap.....	21.00 to 23.00

Finished Iron and Steel.—Producing interests are rapidly going completely to a war basis. Manufacturers who are making machinery that is being used

in connection with the war are finding it necessary to make application for priority certificates under the present policy of the Government. Makers of products non-essential to the war program are finding it pretty difficult to obtain supplies, as it is evident the Government is going to know just what orders the steel companies have on their books and be satisfied that the percentage of direct Government orders is suitable and allow only a very small percentage of commercial orders to be filled until Government requirements are fully satisfied. There is a large amount of business in cold-rolled steel shafting before the market, but it is very difficult to obtain the larger sizes, and some buyers hold desirable specification of small rounds to force producers to take large rounds in conjunction with the small, but such course appears to be of no avail.

New York

NEW YORK, May 14.

Pig Iron.—Owing to the extremely hard usage which they have had for many months, and to the inferior character of much of the coke which is now being delivered, it being high in both sulphur and ash, furnaces in eastern Pennsylvania are having great difficulty in getting their silicon up to the No. 2 foundry grade. Much of it is no better than gray forge. The situation as to deliveries continues to improve. It is now very satisfactory in the Buffalo district, and fairly good in Virginia and eastern Pennsylvania. The Inland Transportation Committee of the War Department is pursuing the policy of directing railroad agents to furnish cars for the delivery of pig iron intended for foundries engaged on war work and the results are generally approved by both buyers and sellers. Some extraordinary efforts have been made recently to obtain vessel tonnage in which to ship pig iron from the South, but so far shipments are confined entirely to railroads. We quote as follows for tidewater delivery:

No. 1 X.....	\$35.25
No. 2 X.....	34.25
No. 2 plain.....	33.75
No. 1 Southern	\$39.75 to 40.25
No. 2 Southern (rail and water)....	39.00 to 39.25
No. 2 Southern (all rail).....	39.15 to 39.65
No. 2 X Virginia	37.02

Ferroalloys.—In view of the fact that April imports of manganese ore were small, and that those of May will probably be limited, it has been virtually concluded by those in authority at Washington that a fairly large quantity of British ferromanganese will be permitted to come in before the final prohibition, which was effective May 13, is fully enforced. The amount may run up to 10,000 tons. It is known that several British producers have supplies which they can send forward and it is their natural desire to do so, because the American price is quite a little higher than that for British domestic consumption. One selling firm in New York has 1300 tons on the sea for delivery here on contract, and his principal has enough alloy in sight to fill all contracts in America. The market is fairly active. There have been sales of sizable lots of 70 per cent alloy for \$250, delivered, and inquiries for several others. One consumer is asking for 1000 tons for delivery over the rest of the year and another for 500 tons within the next 60 days. It is understood that a large Middle Western consumer has purchased 3000 tons for delivery in the third quarter and another 500 tons for the same position. There is also a sale of 300 tons for forward delivery. That April had the largest month's output of domestic ferromanganese in the country's history has been a surprise. It was about 27,700 gross tons, according to the blast furnace reports of THE IRON AGE. Imports in April have also been in fairly good volume. The spiegeleisen market is active and strong at \$70, furnace, for 16 per cent alloy, with \$3.50 per unit above this standard. One large consumer is inquiring for 4000 tons for delivery over the rest of the year, and there are still large quantities before the market. There have been sales of 1000 tons and 250 tons for delivery in the last half. Production in April was low, under 8000 tons, accord-

ing to reports to THE IRON AGE. The 50 per cent ferro-silicon market is a little easier, with the spot quotation about \$175 to \$185 per ton, with contract material at \$150 to \$165. This easier position is due to the fact that there are three or four new producers about to offer alloy, but they are all makers on a small scale. Some other ferroalloys in which there are few market changes from week to week are quoted in this paragraph in the first week of each month. It is an interesting fact that of the 19,300 tons of manganese ore imported in March, about 10,000 tons came from Cuba and only 6000 tons from Brazil.

Finished Iron and Steel.—The steel for the cars to be built for the Railroad Administration has not yet been allocated nor have contracts been let for the specialties. Prices have been asked on 300,000 axles, corresponding to 75 per cent of the total needs. It is stated that if the axle prices do not seem reasonable, request may be made for makers' cost sheets and thus the intimation is that the purchase of car axles is likely to parallel that of the car construction, awarded two weeks ago. It is understood that axle makers, who have been selling at 4.85c. to 5c. per lb., believe that a fair price on the Government business would be \$7 or \$8 per ton below the higher price, but that the Railroad Administration is looking for a cut of at least \$15 per ton. As to general conditions, if there is one outstanding feature it is that mills are quite generally following literally the stipulations of the so-called 100 per cent pledge and for the moment even steel bars, of which there is large rolling capacity in the country, will be substantially impossible to get for ordinary needs unless rolled from shell discard steel. In one quarter it is learned that charcoal boiler tubes may be bought by the general consumer, as the Government program does not appear to include these, at least for the recently placed locomotives, seamless steel tubes instead being specified. A number of fabricated steel projects have been closed, including 1400 tons for the Southern Railway, awarded to the McClinton-Marshall Co.; 450 tons at Lake Denmark, to the Austin Co.; 400 tons for Yale University, to the Berlin Construction Co.; 200 tons for the Morse Dry Dock & Repair Co., to the National Bridge Co., and some 3500 tons have also been awarded for the Atlantic Loading Co., at Elwood, N. J. Bids have been taken for two piers at Norfolk, Va., for the Quartermaster Department, involving 1800 tons. Mill shipments are quoted as follows: Steel bars, 3.095c.; shapes, 3.195c.; plates, 3.445c., and bar iron, 3.695c., all at New York. Out-of-store prices are 1c. higher.

Cast-Iron Pipe.—Cast-iron pipe manufacturers are greatly worried over the present condition of affairs, as they are unable to obtain enough pig iron to keep in anything approaching full operation. While some of them are doing a great deal of Government business, most of them also are doing a larger percentage of general commercial business or are furnishing pipe for purposes that are not considered strictly in the war class. It is understood that the American Waterworks Association will send a petition to Washington urging that cast-iron pipe be placed in a preferred class as necessary for the preservation of the public health, particularly in towns which have been growing rapidly on account of war business, and find it necessary to extend their corporate lines and build many new houses. The city of New York is in the market for 400 tons of 8 and 12-in. pipe on which bids will be received May 20. Government prices are as follows: \$55.35, New York, for 6-in. and heavier, and \$58.35 for 4-in.; \$65.35 for 3-in., and \$1 additional for Class A and gas pipe.

Old Material.—Railroads almost without exception are selling scrap direct to mills, consumers thus saving commissions. Some of the larger mills are paying commissions and some are not, but smaller consumers generally are paying commissions. The market is strong and the demand is especially active for all kinds of cast scrap, for which no difficulty would be experienced in obtaining prices higher than those fixed by the Government if it were permissible. Sales of stove plate, locomotive grate bars and malleable cast are now almost

entirely for shipment to eastern Pennsylvania. We quote prices of brokers to New York producers and dealers as follows, per gross ton, New York:

	Per Gross Ton
Heavy melting steel	\$26.00 to \$26.50
Rerolling rails	31.50
Relaying rails	60.00 to 70.00
Iron and steel car axles	44.00 to 44.30
No. 1 railroad wrought	31.50 to \$1.80
No. 1 railroad wrought cut to not less than 10 in. or over 24 in.	36.50
Wrought-iron track scrap	29.50
Forge fire	23.50 to 24.00
No. 1 yard wrought long	30.50
Light iron	10.00 to 11.00
Cast borings (clean)	16.00 to 16.50
Machine-shop turnings	16.00 to 16.50
Mixed borings and turnings	15.50 to 16.00
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long	30.00 to 30.50
Stove plate	22.50 to 23.00
Locomotive grate bars	22.00 to 22.50
Malleable cast (railroad)	31.00 to 31.50
Old carwheels	26.50
Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:	\$34.00
No. 1 machinery cast	\$34.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	34.00
No. 1 heavy cast, not cupola size	29.00
No. 1 cast (radiators, cast boilers, etc.)	\$27.00 to 28.00

Cincinnati

CINCINNATI, May 14 (By Wire).

Pig Iron.—There is much speculation as to the probable effect of the proposed plan for allotting pig iron and establishing the zone system. The plan is considered here as being impracticable, as the nearby furnaces are unable to supply melters with sufficient iron to keep them operating at anything like full capacity. Nearly all foundries in this territory are engaged on Government work either directly or indirectly and it is thought that the needs of the agricultural implement manufacturers as well as motor truck makers should also place them in the essential column. A large number of inquiries for foundry iron are pending, but numbers of them are duplicate requests for prices that were put out some time ago. Some iron in the South is yet to be disposed of for last half shipment, but practically all furnaces are holding back and are not willing to dispose of the metal at the present time. The largest reported sale is 500 tons of No. 1 Southern foundry to a northern Ohio melter for last half delivery. The supply of high sulphur iron in the Birmingham district is dwindling and only occasional carloads can be picked up by consumers. The Ironton district is sold up practically for the remainder of the year, although a little silvery iron has been bought lately for last-quarter shipment. It is rumored that some Virginia iron may be placed on the market within the next few days.

Based on freight rates of \$2.90 from Birmingham and \$1.26 Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 2 foundry and No. 2 soft	\$35.90
Southern Ohio, No. 2	34.26
Basic, Northern	33.26

Finished Material.—Although the demand for wire nails is very much behind the average for this season of the year, the jobbers have had a great deal of trouble in getting shipments from the mills, and on account of the short stocks the price is very much firmer and most all transactions are now made at \$4.10 per keg base. Barb wire, which is considered as an essential, is also hard to get and frequently a carload is received and is divided into outbound shipments within a few hours after it is unloaded. Jobbers' stocks of structural shapes as well as reinforced concrete rods are being depleted at a rapid rate and not very much material is now being received from the mills. Quotations on this class of material are unchanged.

Jobbers' prices are as follows: Iron and steel bars, 4.08½c.; twisted bars, 4.36½c. base; structural shapes, 4.18½c.; plates, ¾-in. and heavier, 4.43½c.; No. 10 blue annealed sheets, 5.43½c.; cold rolled shafting, 10 per cent plus list. The mill price on No. 28 black sheets remains at 5.18½c. and on No. 28 galvanized, 6.43½c. The warehouse price on wire nails is now at \$4.10 per keg base.

Coke.—The embargo on shipments to New England territory from the Connellsville district has enabled

producers to divert a considerable tonnage to nearby consumers. While the shortage of labor in that field causes concern, the output is said to have been increased and cars are now more readily obtained. Shipments from both the Wise County and Pocahontas fields are moving more promptly, and on the whole, the situation now shows considerable improvement. No new contracting is reported, except for a few lots of 72-hr. coke that nearby foundries have been able to pick up. No New River coke can be had now for any shipment.

Old Material.—No marked readjustment of prices has been made since the commission question was settled. About the only classes of scrap on which the dealers are able to obtain the maximum Government prices are heavy melting scrap, and No. 1 machine cast. Relaying rails are so scarce that any figure quoted would be only a nominal one. Old car wheels are in a little better demand, but the supply is short. The following are dealers' prices f. o. b. at yards, southern Ohio and Cincinnati:

	Per Gross Ton
Bundled sheet scrap	\$19.00
Old iron rails	\$32.00 to 32.50
Relaying rails, 50 lb. and up	44.00 to 44.50
Rerolling steel rails	31.50 to 32.00
Heavy melting steel scrap	26.00 to 26.50
Steel rails for melting	27.00 to 27.50
Old carwheels	28.50 to 29.00

	Per Net Ton
No. 1 railroad wrought	\$28.50 to \$29.00
Cast borings	13.00 to 13.50
Steel turnings	13.00 to 13.50
Railroad cast	25.00 to 25.50
No. 1 machinery	25.50 to 26.00
Burnt scrap	16.50 to 17.00
Iron axles	40.00 to 40.50
Locomotive tires (smooth inside)	33.50 to 34.00
Pipes and flues	20.00 to 20.50
Malleable cast	24.50 to 25.00
Railroad tank and sheet	17.00 to 17.50

Cleveland

CLEVELAND, May 14.

The Lake Superior ore requirements for the season 1918 will be 61,813,000 tons, according to figures secured from consumers and tabulated for the Pig Iron, Iron Ore and Lake Transportation Committee. This tonnage is larger than some ore men expected, but it is not thought that the Lake fleet will have any trouble in bringing down this quantity of ore provided the railroads are able to furnish a fair supply of cars at lower Lake ports so that the movement will not be restricted. Water shipments last year were 62,498,901 gross tons, and during the previous year 64,734,198 tons. The policy of the Government in urging steelmakers to use Bessemer steel where possible and especially for the manufacture of rails has stimulated the demand for Bessemer ore, and one sale of approximately 100,000 tons is reported. The ore movement down the Lakes, which has been rather slow since the opening of navigation, is improving materially. We quote f.o.b. Cleveland, lower Lake ports as follows:

Old range Bessemer, \$5.95; old range non-Bessemer, \$5.20; Mesaba Bessemer, \$5.70; Mesaba non-Bessemer, \$5.05.

Pig Iron.—Inquiry for pig iron is still fairly heavy, being mostly for foundry grades. Many consumers have not yet covered for their last half requirements. One Cleveland producer still has some foundry iron available for its regular trade. New Government inquiries include 350 tons of No. 2 X and 125 tons of charcoal iron for June and July delivery for an Allentown, Pa., plant, 400 tons of No. 2 foundry for Portland, Ore., both for the Emergency Fleet Corporation, and 500 tons of foundry iron for a Baltimore plant. The latter has been placed, as well as 1000 tons of Bessemer for a Washington plant. The 3000 tons of prompt shipment basic wanted by a Chester, Pa., plant has been secured by commandeering iron stored in Harrisburg, Pa., for shipment to Italy. The basic situation has apparently eased up a little. It is stated that several of the Ohio steelmakers who have been in the market for some time for basic iron for the last half have finally succeeded in covering for about all their requirements. There is an active

inquiry for Southern iron in this territory, some of this coming from consumers who have not been able to purchase all the iron they will require from Northern furnaces. One Tennessee furnace during the week opened its books for some additional tonnage from those of its regular trade having Government orders, and booked 1400 tons for three Cleveland consumers. We quote f.o.b. Cleveland, as follows:

Bessemer	\$36.15
Basic	32.30
Northern No. 2 foundry	33.30
Southern No. 2 foundry	37.00
Gray forge	32.30
Ohio silvery, 8 per cent silicon	46.12
Standard low phosphorus, Valley furnace	53.00

Old Material.—The demand for scrap continues dull, activity being confined mostly to heavy melting steel and turnings. There is some demand for the latter for shipment to the Pittsburgh district, and the price is slightly firmer. Prices on foundry scrap in cupola sizes and busheling are a little firmer. Small lots of the former have sold at \$33 gross, but this price does not represent the market. Small lots of busheling scrap have sold at the Government price of \$31. It is intimated that the Government will make changes on some grades of scrap for the third quarter. Consumers of busheling claim that this grade is so high that they can not make bar iron at a profit at the Government price. Foundrymen feel that the price on cast scrap in cupola size should be as low as heavy melting steel. However, in this market cupola cast scrap stays well below the Government maximum of \$34. Dealers quote, f.o.b. Cleveland, as follows:

Steel rails	\$27.00 to \$28.00
Steel rails, rerolling	34.00
Steel rails, under 3 ft	34.50
Iron rails	39.00
Iron car axles	46.50
Steel car axles	46.50
Heavy melting steel	29.00
Cast borings	17.00 to 17.50
Iron and steel turnings and drillings	17.00 to 17.50
No. 1 railroad wrought	34.00
Hydraulic compressed sheet scrap	28.00 to 29.00
Cast iron car wheels, unbroken	29.00
Cast iron car wheels, broken	34.00
Agricultural malleable	24.00 to 25.00
Railroad malleable	34.00
Steel axle turnings	24.00
Light bundled sheet scrap	24.50 to 25.00
Cast iron scrap	29.00
Cast iron scrap, broken to cupola size	31.00 to 32.00
No. 1 busheling	30.00 to 31.00

Per Net Ton

Railroad grate bars	21.00 to 21.50
Stove plate	21.00 to 21.50

Bolts, Nuts and Rivets.—The United States Railroad Administrator has sent out an inquiry for 18,000 tons of bolts, and 15,000 tons of rivets to cover the requirements of the new car building program. Each manufacturer is asked to give the capacity of his plant. While quotations are asked for, it is stated that the orders will probably be placed directly by the car builders. Another large Government inquiry has developed, this coming from the Engineers' Department for 20,000,000 to 25,000,000 machine and miscellaneous bolts. Bolt makers are now operating at about 75 per cent of capacity, scarcity of raw material and labor restricting their output to that extent. Shading of the Government price on rivets is reported on an export order for a small tonnage placed during the week.

Finished Iron and Steel.—Manufacturers in commercial lines are finding it almost impossible to secure steel now that mills are diverting their entire product for war essential industries. Deliveries on steel for which specifications were entered before the whole steel producing capacity was mobilized for Government needs are not being made, and jobbers are getting very little material. Some of the mills are supplying jobbers with steel, provided the latter are taking orders only for material for Government work. Production is already being curtailed in some manufacturing plants in departments engaged on commercial work and traveling salesmen are being recalled from the road, plant managers deciding to book no further orders until they can be assured a supply of steel. Manufacturers have cut off

shipments of woven wire fence, but jobbers have fair stocks of this material. The implement trade is being taken care of fairly well, although some of these manufacturers are suffering from lack of material. Jobbers at present are well supplied with steel bars, but their stocks of plates and structural material are badly broken, and very low. Unless they are able to replenish their stocks some jobbers state that they will be practically out of business within 60 days. New Government demand is heavy, but mills are already so crowded that many consumers with priority orders are having trouble in placing the required tonnage for the delivery wanted. Among large inquiries is one for 3500 tons of blooms for naval guns, and 1100 tons of steel for gun mountings. Almost no sheets are available for commercial consumers.

We quote warehouse prices as follows: Steel bars, 4.03 1/2 c.; plates, 4.38 1/2 c.; structural material, 4.13 1/2 c.; No. 10 blue annealed sheets, 5.35 c.; No. 28 black sheets, 6.35 c.; No. 28 galvanized sheets, 7.60 c.

IRON AND INDUSTRIAL STOCKS

United States Steel Shares Lead in First Active Buying of the Year

NEW YORK, May 13.

Both stocks and bonds showed a pronounced strengthening last week, and at the same time there was a great broadening of activity which originated early in the week from increased transactions by professional elements followed toward the end by the greatest participation by the public since last fall. This resulted in transactions exceeding the million share mark on two days. Speculative interest centered on U. S. Steel, com., which advanced from 97 1/2 to 109 1/2, and gains of several points were the rule with other steel shares.

The range of prices on active iron and industrial stocks on Wednesday of last week and Wednesday of this week was as follows:

Allis-Chalm. com. 28 1/4 - 31 1/4	Int. Har. of N. J. pf. 108%
Allis-Chalm. pf. 83 - 85 1/2	Lackawanna Steel 83 3/4 - 89 1/2
Am. Can com. 43 3/4 - 46 3/4	Lake Supr. Corp. 15 1/4 - 17
Am. Can pf. 96 1/4 - 97	Lima Loco. 44 - 47
Am. Car & Fdry. com. 78% - 80	Midvale Steel 47 1/2 - 50%
Am. Car & Fdry. pf. 110	Nat.-Acme 32 - 33
Am. Loco. com. 65 - 67 1/2	Nat. Enam. & Stm. com. 50 1/2 - 53 3/4
Am. Loco. pf. 98 1/2 - 100	N. Y. Air Brake 129 - 131
Am. Ship com. 130 - 145	Nova Scotia Steel 61 1/2 - 62 1/2
Am. Steel Fdrys. 64 1/2 - 67 1/2	Pittsbhg. Steel pf. 93
Bald. Loco. com. 81% - 88 1/2	Pressed Stl. com. 59 1/2 - 62 1/2
Bald. Loco. pf. 100	Pressed Steel pf. 93
Beth Steel com. 85 - 88 1/2	Ry. Steel Spring com. 55 1/2 - 57
Beth Stl. Cl. B. 83 3/4 - 88 1/2	Ry. Steel Spring pf. 97 1/2 - 98
Cambria Steel 125 - 127	Republic com. 86 1/2 - 91 1/2
Case (J. I.) pf. 87	Republic pf. 98 - 98 1/2
Central Fdry. pf. 37 1/2 - 39	Sloss com. 61 1/2 - 63 1/4
Cent. Fdry. com. 48 1/2 - 49	Superior Steel 42 1/2 - 44 1/4
Chic. Pneu. Tool. 67 - 68	Transue-Williams 40 - 40 1/2
Colo. Fuel 42 1/4 - 45 1/4	Un. Alloy Steel. 42 - 44 1/2
Crucible Steel pf. 91	U. S. Pipe com. 14 1/2 - 15 1/4
Deere & Co. pf. 95 1/2	U. S. Pipe pf. 43 1/2
Gen. Electric 143 1/4 - 149 1/2	U. S. Steel com. 102 1/2 - 112
Gt. No. Ore Cert. 30 1/4 - 33 1/4	U. S. Steel pf. 110 - 110 1/2
Gulf States Steel 104 1/2 - 109 1/2	Va. I. C. & Coke. 68 - 69 1/2
Int. Har. of N. J. com. 129 - 131 1/2	Warwick 8 - 8 1/2
	Westingh. Elec. 41 1/2 - 42 1/2

Dividends

The American La France Fire Engine Co., quarterly, 1 1/4 per cent on the common, payable May 15.

The American Radiator Co., quarterly, 3 per cent on the common, payable June 29, and 1 1/4 per cent on the preferred, payable May 15.

Deere & Co., quarterly, 1 1/4 per cent, payable June 10.

The Eastern Steel Co., quarterly, 2 1/2 per cent on the common and 1 1/4 per cent on the first and second preferred, all payable June 15.

The Inland Steel Co., quarterly, 2 per cent, payable June 1.

The International Harvester Corporation, quarterly, 1 1/4 per cent on the preferred, payable June 1.

The International Harvester Corporation of New Jersey, quarterly, 1 1/4 per cent on the preferred, payable June 1.

The Lima Locomotive Works, Inc., semi-annual, 3 1/4 per cent on the preferred, payable May 10.

The National-Acme Co., quarterly, 75c, payable June 1.

The Pittsburgh Steel Co., quarterly, 1 1/4 per cent on the preferred, payable June 1.

The Savage Arms Corporation, quarterly, 1 1/2 per cent on the common, 1 1/4 per cent on the first preferred and 1 1/2 per cent on the second preferred, all payable June 15.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on iron and steel articles, aside from wrought iron and steel pipe in carloads, per 100 lb., New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 13.5c.; Cincinnati, 18.5c.; Indianapolis, 20c.; Chicago, 21.5c.; St. Louis, 27c.; Kansas City, 47c.; minimum carload, 36,000 lb.; St. Paul, 40c.; minimum carload, 36,000 lb.; Denver, 79c.; minimum carload, 36,000 lb.; Omaha, 47c.; minimum carload, 36,000 lb.; New Orleans, 30.7c.; Birmingham, 46c.; Pacific Coast, \$1.00; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is \$1.05, minimum carload, 40,000 lb.; and \$1.00, minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 40c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 40c., minimum carload 46,000 lb.; to St. Paul, 35.5c., minimum carload 46,000 lb.; Denver, 79c., minimum carload 46,000 lb. A 3 per cent transportation tax now applies. On iron and steel items not noted above, rates vary somewhat, and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees, structural sizes, 3c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire and fence staples, \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large rivets	\$4.65 base
7/16 in. x 6 in. smaller and shorter rivets, 45-10 per cent off list	
Machine bolts h.p. nuts, $\frac{1}{4}$ in. x 4 in.	50-10-5 per cent off list
Smaller and shorter, rolled threads	50-10-5 per cent off list
Cut threads	50-5 per cent off list
Larger and longer sizes	40-10 per cent off list
Machine bolts c.p.c. and t. nuts, $\frac{1}{4}$ in. x 4 in.	40-10 per cent off list
Smaller and shorter	35-5 per cent off list
Larger and longer	35-5 per cent off list
Carriage bolts, $\frac{1}{4}$ in. x 5 in.	
Smaller and shorter, rolled threads	50-5 per cent off list
Cut threads	40-10 per cent off list
Larger and longer sizes	40 per cent off list
Lag bolts	50-10 per cent off list
Flow bolts, Nos. 1, 2, 3	50 per cent off list
Hot pressed nuts, sq. blank	2.50c. per lb. off list
Hot pressed nuts, hex. blank	2.30c. per lb. off list
Hot pressed nuts, sq. tapped	2.30c. per lb. off list
Hot pressed nuts, hex. tapped	2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank	2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped	2.00c. per lb. off list
semi-finished hex. nuts:	
$\frac{1}{4}$ in. and larger	60-10-10 per cent off list
9/16 in. and smaller	70-5 per cent off list
Stove bolts	70-10 per cent off list
Stove bolts	2 1/2 per cent extra for bulk
Tire bolts	50-10-5 per cent off list

The above discounts are from present lists now in effect.
All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. Prices on high carbon rods are irregular. They range from \$70 to \$80, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4 1/2 in. and heavier, per 100 lb., \$3.90, in lots of 200 kegs of 200 lb. each, or more; track bolts, \$4.90. Boat spikes, \$5.25 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Effective Nov. 7 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, I.C., \$15.30; 12-lb. coating, I.C., \$16.75; 15-lb. coating, I.C., \$17.75; 20-lb. coating, I.C., \$19; 25-lb. coating, I.C., \$20; 30-lb. coating, I.C., \$21; 35-lb. coating, I.C., \$22; 40-lb. coating, I.C., \$23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Inches	Steel	Black	Galv.	Iron			
				Black	Galv.	Black	Galv.
1/8, 1/4 and 3/8	44	17 1/2	1 1/8	23	44	4	4
1/2	48	33 1/2	1 1/8	24	44	4	4
5/8 to 3	51	37 1/2	1 1/2	28	40	10	10
			1 1/2 to 1 1/4	33	17	12	12

Butt Weld

Inches	Steel	Black	Galv.	Inches	Steel	Black	Galv.
2	44	31 1/2	1 1/4	18	3		
2 1/2 to 6	47	34 1/2	1 1/2	25	11		
7 to 12	44	30 1/2	2	26	12		
13 and 14	34 1/2	..	2 1/2 to 6	28	15		
15	32	7 to 12	25	12			

Lap Weld

Inches	Steel	Black	Galv.	Inches	Steel	Black	Galv.
2	40	22 1/2	1 1/4	19	4		
2 1/2 to 4	45	32 1/2	1 1/2	25	11		
4 1/2 to 6	44	32 1/2	2	27	14		
7 to 8	40	26 1/2	2 1/2 to 4	29	17		
9 to 12	35	21 1/2	4 1/2 to 6	28	16		
			7 to 8	20	8		
			9 to 12	15	3		

Butt Weld, extra strong, plain ends

Inches	Steel	Black	Galv.	Inches	Steel	Black	Galv.
1 1/2, 1/4 and 3/8	40	22 1/2	1 1/4	22	5		
1 1/2	45	32 1/2	1 1/2	27	14		
5/8 to 1 1/2	49	36 1/2	1 1/2 to 1 1/4	33	18		
2 to 3	50	37 1/2	1 1/2				

Lap Weld, extra strong, plain ends

Inches	Steel	Black	Galv.	Inches	Steel	Black	Galv.
2	42	30 1/2	1 1/4	19	4		
2 1/2 to 4	45	33 1/2	1 1/2	25	11		
4 1/2 to 6	44	32 1/2	2	27	14		
7 to 8	40	26 1/2	2 1/2 to 4	29	17		
9 to 12	35	21 1/2	4 1/2 to 6	28	16		
			7 to 8	20	8		
			9 to 12	15	3		

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel	Charcoal Iron		
	3 1/2 to 4 1/2 in.	3 to 3 1/2 in.	2 1/2 to 2 1/4 in.
3 1/2 to 4 1/2 in.	12 1/2		
2 1/2 to 3 1/4 in.	14	+ 5	
2 1/4 in.	17 1/2	+ 7 1/2	
1 1/4 to 2 in.	13	+ 22 1/2	
		1 1/2 to 1 1/4 in.	+ 35

Standard Commercial Seamless—Cold Drawn or Hot Rolled	
Per Net T.	Per Net T.
1 in.	\$240
1 1/4 in.	280
1 1/8 in.	270
1 1/2 in.	220
	4 1/2 to 5 in.

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows, 30 days net or 2 per cent discount in 10 days:

Blue Annealed—Bessemer	
	Cents per lb.
No. 8 and heavier	4.20
Nos. 9 and 10	4.25
Nos. 11 and 12	4.30
Nos. 13 and 14	4.35
Nos. 15 and 16	4.45

Box Annealed, One Pass Cold Rolled—Bessemer	
	Cents per lb.
Nos. 17 to 21	4.80
Nos. 22 and 24	4.85
Nos. 25 and 26	4.90
No. 27	4.95
No. 28	5.00
No. 29	5.10
No. 30	5.20

Galvanized Black Sheet Gage—Bessemer	
	Cents per lb.
Nos. 10 and 11	5.25
Nos. 12 and 14	5.35
Nos. 15 and 16	5.50
Nos. 17 to 21	5.65
Nos. 22 and 24	5.80
Nos. 25 and 26	5.95
No. 27	6.10
No. 28	6.25
No. 29	6.50
No. 30	6.75

Tin-Mill Black Plate—Bessemer	
	Cents per lb.
Nos. 15 and 16	4.80
Nos. 17 to 21	4.85
Nos. 22 to 24	4.90
Nos. 25 and 27	4.95
No. 28	5.00
No. 29	5.05
No. 30	5.05
Nos. 30 1/2 and 31	5.10

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery										
	Copper, New York	Tin, Electro-	New York	Lead	New St.	Spelter				
May	Lake	Lytic	York	New York	St. Louis	St. Louis				
8.....	23.50	23.50	*\$1.00	6.70	6.50	7.12½	6.87½			
9.....	23.50	23.50	*\$1.00	6.75	6.55	7.12½	6.87½			
10....	23.50	23.50	*\$1.00	6.80	6.60	7.25	7.00			
11....	23.50	23.50	*\$1.00	6.85	6.65	7.25	7.00			
12....	23.50	23.50	*\$1.00	6.90	6.70	7.37½	7.12½			
14....	23.50	23.50	*\$1.00	6.90	6.70	7.37½	7.12½			

*Nominal.

NEW YORK, May 15.

Inactivity pervades nearly all the markets but the tone is stronger and prices in some cases higher. Copper is in strong demand for May delivery. Tin prices have not advanced in the last week but offerings are exceedingly limited for any position. Lead is more active and higher. Spelter is firmer and higher on limited transactions. Antimony is lower.

Copper.—The trade is looking forward eagerly to the meeting in Washington, May 22, when the question of a new price for copper, effective June 1, will be discussed and settled. Many fully expect an advance of from $\frac{3}{4}$ c. to $1\frac{1}{2}$ c. per lb. It is acknowledged that the demand for May delivery is so great, especially from the British and French, that refiners will have trouble in meeting it. While consumers are willing to book orders for delivery after June 1, there is not much disposition to do this extensively on the part of the producers until the demand and supply are more accurately gaged and allocated and the price question has been settled. Some companies report a falling off in production in the first quarter as compared with the last quarter of 1917.

Tin.—The market has been quiet the past week and is likely to continue so for some time. Very little tin of any grade for any position has come out for sale, especially for shipment from the Far East. What was offered was promptly sold at 97c. to 98c. for May, June and July shipment, but the volume was not large. More could have been disposed of had there been offerings. Spot metal continues quotable strictly nominal at \$1 to \$1.05 or higher, but there is no one offering any. As high as \$1.25 is reported offered for a small lot, about 10 tons, of Straits tin, but no definite information is obtainable. Arrivals to May 9 inclusive have been 595 tons with 5000 tons estimated as afloat. The London market has declined in the last week £6 per ton, to £375 for spot Straits.

Lead.—A decided improvement manifested itself in the last half of last week and by Saturday lead was selling up to 6.60c. to 6.65c., St. Louis, a fair advance on prices early in the same week. The volume of business reported was not large nor has it been since then but there were more buyers than sellers at that. A feature of the situation is that there is not much prompt lead being offered. The explanation of the higher levels is that the lead pressed for sale the last week has been absorbed. Whether the upward trend is only temporary remains to be seen. Yesterday the quotation for early delivery was 6.70c., St. Louis, or 6.90c., New York. The outside market is again very close to the level of the leading producer, whose quotation is unchanged at 7c., New York.

Spelter.—The underlying tone is much stronger and prices have advanced quite sharply the past week. Yesterday prime Western was quoted and sold at 7.12½c. to 7.25c., St. Louis, or 7.37½c. to 7.50c., New York, for May delivery with not less than 7.37½c., St. Louis, or 7.62½c., New York, asked for June. There has been some inquiry for third quarter but not much disposition to sell for that position. The higher levels are due partly to the Government buying of recent days and to the quantities of metal taken out of the market at the lower levels of the recent past, as well as to the reluctance of some producers to sell even at present

prices. A stronger market is looked for. The Government is inquiring for 1000 tons of Grade C spelter.

Antimony.—The market is lower at 12.75c., New York, duty paid, for prompt and early delivery.

Aluminum.—Government prices control the market for No. 1 virgin metal, 98 to 99 per cent pure, and range from 32c. to 32.20c. per lb. in lots of 50 tons down to one ton.

Old Metals.—The market is very dull, particularly zinc. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	23.50
Copper, heavy and wire	23.50
Copper, light and bottoms	21.00 to 21.50
Brass, heavy	16.25 to 16.50
Brass, light	12.00 to 12.25
Heavy machine composition	23.75 to 24.00
No. 1 yellow rod brass turnings	13.00 to 13.50
No. 1 red brass or composition turnings	19.00 to 20.00
Lead, heavy	6.50
Lead, tea	5.50
Zinc	5.50

Chicago

MAY 14.—The eager demand for tin continues, particularly by consumers who want deliveries expedited. Although the metal is scarce, it is believed there will be enough. It is quoted at 1.05 to 1.15 cents per lb. Copper is moving smoothly at 23.50c. for carloads, and 24.67½c. for part carloads. Lead is in better demand, a satisfactory business having been done the past week, and the Government taking more than was expected. Independents have advanced their prices, and the Chicago quotation is 6.70c. to 6.75c. Though a trifle higher, spelter is quiet at 7.25c. to 7.35c. Antimony is quiet and weaker at 14c. to 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 21c.; copper clips, 21c.; copper bottoms, 19c.; red brass, 21c.; yellow brass, 14c.; lead pipe, 5c.; zinc, 4.50c.; pewter, No. 1, 60c.; tinfoil, 65c.; block tin, 70c.

St. Louis

MAY 13.—Nonferrous metals have been rather quiet but a little stronger in price as a result of the decision on the part of the smelters to pay higher prices for top grade ores. On carload lots the closing quotations were: Lead, 6.62½c. to 6.92½c.; spelter, firm at 7.25c. to 7.37½c.; on less than carloads, lead, 7.25c.; spelter, 8c.; tin, \$1; copper, 25.12½c.; Asiatic antimony, 15c. In the Joplin district, by agreement between producers of high grade ore and smelters, about 1500 tons of zinc blende brought \$75 per ton, basis of 60 per cent metal, being about three-fifths of the high grade production of the district. A larger sale brought about \$55 per ton and the remainder ranged from \$40 to \$42.50, making the average for the week, because of the quantity of low grade ore sold, about \$42 per ton. Calamine was quiet at \$28 to \$32 per ton basis of 40 per cent metal, with the average for the week at \$30. Lead ore was steady at \$80 per ton, basis of 80 per cent metal. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 20c.; pewter, 25c.; tinfoil, 55c.; lead, 5.50c.; tea lead, 5c.; zinc, 5c.

Platinum Production in 1917

According to figures compiled by J. M. Hill of the U. S. Geological Survey only 605 oz. of crude platinum was sold by placer mines in 1917. This is less than the sales in 1916 by about 100 oz. The imports of crude platinum amounted to 31,921 oz., not counting the 21,000 oz. of Russian crude platinum which was received by the Government late in December.

In 1917 refiners made about 33,000 oz. of platinum, 4800 oz. of palladium, 833 oz. of osmiridium, and 210 oz. of iridium, which can be called new metals. Of this amount about 7400 oz. probably originated from domestic materials.

The saving of scrap platinum of all classes resulted in much larger recoveries of secondary platinum metals than in previous years, a total of 72,000 oz. being recovered, as compared with 48,000 oz. in 1916.

DRASTIC ACTION TAKEN

New Regulations in Regard to Making Articles for Export

WASHINGTON, May 14.—Drastic action has been taken by the War Trade Board for the purpose of "preventing the useless consumption of materials and labor in making articles for export which, for the present, may not be exported and for the purpose of saving tonnage by prohibiting the exportation of articles which have not been recommended by the Government of the country of destination as being necessary for their essential requirements." After consultation with the War Industries Board and the missions of the respective European Allies, the War Trade Board has adopted the following rules and regulations in addition to those heretofore promulgated with respect to the issuance of licenses to export any commodity to the United Kingdom, France, Italy and Belgium (excluding their respective colonies, possessions and protectorates):

On and after May 15, 1918, applicants, before filing applications for licenses to export any commodity to the above named countries, must obtain thereon the written approval of the mission in the United States of the country to which the exportation is to be made. To secure this approval, applicants should forward their applications, duly executed, in triplicate, with proper supplemental sheets attached thereto, including Supplemental Sheet X-11 or X-12, as may be required, to:

The British War Mission, Munsey Building, Washington, for shipments to the United Kingdom.

The French High Commission, 1954 Columbia Road, N. W., Washington, for shipments to France.

The Italian High Commission, 1712 New Hampshire Avenue, N. W., Washington, for shipments to Italy.

The Belgian Commission, Room 202, Council National Defense Building, Washington, for shipments to Belgium.

One copy of approved applications will be forwarded by the missions directly to the War Trade Board, Bureau of Exports, Washington; one copy retained; and the other copy returned to the applicant for his convenience in keeping a record.

Applicants will be required to agree with the War Trade Board not to purchase nor acquire for export nor take any steps in the process of producing, manufacturing or fitting for export the articles specified in the application until an export license has been duly granted.

If, prior to May 15, 1918, any of the articles specified on such applications were purchased or acquired for export, or if any steps were taken in the process of producing, manufacturing, or fitting for export such articles, applicants must agree that, after export licenses have been issued, exportation thereunder will not be made until the written approval of the United States War Industries Board has been received with respect to articles specified on Schedule A. In such case, the applicant should use Supplemental Information Sheet X-12 in place of Sheet X-11. Applicants should not apply to the United States War Industries Board for approvals until they are actually in receipt of export licenses.

On July 1, 1918, all outstanding licenses granted on or before May 14, 1918, will be revoked. Any goods not then exported against such licenses may thereafter be shipped only if licenses are secured after being applied for as above set forth.

Schedule A as of May 13, 1918, includes the following items: Aluminum (metal); asbestos; boilers, high pressure steam; carbon electrodes; chromium ore; copper (metal); copper wire and cable; ferroalloys (all); graphite (crucibles and electrodes); iron and steel products, consisting of billets, blooms, boiler tubes, ingots, pig iron, plates, sheet bars, slabs, tin plate, wire rope; machine tools, as follows: slotters (all sizes), grinders (internal, plain and universal), boring machines (horizontal and vertical), boring mills, lathes (30-in. swing and larger), milling machines, No. 3 or universal and

larger, planers (all sizes), radial drills (4-ft. arm and larger); manganese compounds (all); manganese ore; mercury; mica nickel (metal); optical instruments; optical glasses; sodium metallic and any metal or ferro-alloy thereof; spiegeleisen; tin (pig or block); tungsten, tungsten steel and ore and wolframite.

Copies of forms and Supplemental Information Sheets may be obtained from the War Trade Board or from any of its agencies in the principal cities.

National Association of Manufacturers' Annual Convention

The National Association of Manufacturers will hold its twenty-third annual convention at the Waldorf-Astoria Hotel, New York, on May 20, 21 and 22. Among the speakers will be the following:

"Our Shipping," Charles S. Page, United States Shipping Board, Washington.

"Trade Acceptances and the Manufacturer," W. M. Nones, the Norma Co., New York; Lewis E. Pierson, the Irving National Bank, New York.

"France and Her Industrial Needs," Charles F. Beach of Paris.

"Combinations for Foreign Trade," N. B. Williams, counsel, Washington.

"Export Trade During War Time," H. B. Van Sinderen, director, Bureau of Exports, Washington.

"Uniform State Laws," Edwin A. Kranthoff, chairman Committee on Publicity, National Conference, Washington, D. C.

"War Labor Conference Board," C. Edwin Michael, a member of the board, Roanoke, Va.

"Public Affairs and Industry," James A. Emery, counsel, Washington.

"American Industry and the War," James O. Fagan, Waverly, Mass.; Ellis L. Howland, New York; Rev. John H. Randall, New York; A. Parker Nevin, New York.

"Rehabilitating Disabled Soldiers and Sailors," Harry E. Mock, Major, M. R. C., U. S. A.

"Restoring Disabled Soldiers and Sailors to Industry," Prof. H. E. T. Haultain, vocational officer, Toronto, Canada.

"Industrial Housing," Dr. John Nolen, town and city planner, Cambridge, Mass.

Discussion of Labor Turnover

The May meeting of the New York section of the American Society of Mechanical Engineers on Tuesday, May 21, will be featured by a discussion on labor turnover. George R. Woods, assistant to the president, Allied Machinery Co., will be chairman of the meeting and those who will lead in the discussion are L. D. Burlingame, industrial superintendent, Brown & Sharpe Mfg. Co.; John Calder, Aeromarine Plane & Motor Co.; Capt. Boyd Fisher, Ordnance Department, U. S. A.; Dudley Kennedy, American International Shipbuilding Corporation; H. E. Miles, Council National Defense; J. J. Pearson, British War Office; H. F. J. Porter, consulting industrial engineer; Orrin W. Sanderson, director of labor, B. F. Goodrich Co.

Carnegie Steel Co. Furnaces

PITTSBURGH, May 15. (By Wire).—This week the Carnegie Steel Co., Pittsburgh, is operating 53 of its 59 blast furnaces. The company recently started Niles furnace at Niles, Ohio, Steubenville at Steubenville, Ohio, Edith at Pittsburgh and Mingo No. 1 at Mingo Junction, Ohio. Included in the six idle furnaces are two Edgar Thomson stacks, which are being rebuilt and raised above the flood stage in the Monongahela River.

The output of the Dominion Steel Corporation, Sydney, N. S., for March shows a general increase over that of February the production of pig iron amounting to 25,000 tons, compared with 23,000 tons for February; ingots, 30,000 compared with 28,000 tons; blooms, billets and slabs, 24,000 tons compared with 24,000 tons; rods, 9600 tons as compared with 1200 tons; merchant bars, 4200 tons compared with 5500 tons; wire, 1200 as against 1000 tons; wire products, 1100, none was produced in February.

PERSONAL

George H. Charls has resigned as vice-president and manager of sales of the American Rolling Mill Co., Middletown, Ohio, to accept an important official position with the Berger Mfg. Co., Canton, Ohio. Mr. Charls has been connected with the American Rolling Mill Co. for 17 years, beginning as a clerk in the galvanizing department. He was elected vice-president in 1914 and placed in charge of the sales division. He is a member of the American Iron and Steel Institute and has been active in the promotion of export trade in the movement forwarded by the National Foreign Trade Council.



GEORGE H. CHARLS

At a meeting of the board of directors of the Union Switch & Signal Co., Swissvale, Pa., T. W. Siemon, who occupied the dual position of vice-president and treasurer, resigned as treasurer. He will continue as vice-president in charge of sales of the forge department, to which he will devote his entire time. New steam drop hammer equipment, covering 3000, 5000 and 6000-lb. hammers, has recently been added, giving a total of over 30 steam and board drop hammers, with a combined falling weight of over 65,000 lb. and 1000 tons per month production. F. L. Walton is sales manager.

W. H. Peterson, formerly New York sales manager for the Penn Seaboard Steel Corporation, Philadelphia, has become affiliated with Charles Hubbard & Co., 61 Fulton Street, New York, who have been active for many years in the selling of steel castings and heavy forgings. Mr. Peterson's duties will be to take care of this class of work for the shipbuilding program, the requirements for which are very large.

F. C. Harding has retired from the firm of Adams & Harding, Chamber of Commerce Bldg., Detroit, and the firm name has been changed to Adams & Redd.

John T. Faig, for 12 years professor of mechanical engineering, University of Cincinnati, has been appointed president of the Ohio Mechanics' Institute, succeeding John L. Shearer, who recently resigned. Mr. Faig will give special attention to training students in the operation and construction of internal combustion engines.

Archer A. Landon, vice-president American Radiator Co., Buffalo, has been appointed by Director John D. Ryan, director of the production division of the Aircraft Board.

H. D. Wright, manager of the San Francisco office of the Brown Hoisting Machinery Co., Cleveland, has been appointed Pacific Coast Representative of the company, succeeding the Colby Engineering Co. in the Northwest territory.

Col. John Joseph Carty, Signal Corps, U. S. A., has been awarded the Edison medal for 1917 bestowed by the American Institute of Electrical Engineers for "meritorious achievement in electrical science or electrical engineering or the electrical arts." Formal ceremonies of presentation will take place in the Engineering Societies Building, 29 West Thirty-ninth Street, New York, Friday evening, May 17. Dr. Carty, who was chief engineer of the American Telephone & Telegraph Co., is singled out particularly for "his work in the science and art of telephone engineering."

John H. Nelson has resigned from the Bureau of Standards, Washington, to become research engineer with the Wyman-Gordon Co., Worcester, Mass. Previous to 1912, Mr. Nelson was connected with the Case School of Applied Science, Cleveland, and from 1912 to 1915 was professor of strength of materials at Worcester Polytechnic Institute, Worcester, Mass.

F. C. Goldsmith has joined the engineering staff of the New Departure Mfg. Co., Bristol, Conn. He was formerly chief engineer and production manager Davis Sewing Machine Co., Dayton, Ohio.

E. M. Peters, for the past six years president and general manager of the Hamilton-Otto Coke Co., Hamilton, Ohio, has tendered his resignation to take effect June 1. Roy S. Bruner, formerly connected with the engineering department of the Bethlehem Steel Co., has been appointed general manager of the company, succeeding Mr. Peters.

W. H. Bosquet, formerly road manager for the Simplex Machine Tool Co., with headquarters in Cleveland, has been appointed general manager of the company's plant at Hamilton, Ohio. C. G. Kellogg, formerly manager of the plant, has taken a further responsible position with the company and will have supervision over the activities of the Simplex plants doing Government work.

J. J. Eason has accepted a position as works manager of the United States & Cuban Allied Works Engineering Corporation operating the Havana Iron Works and the Havana Dry Dock Co. in Cuba. His address is the Havana Iron Works, Cuba No. 51, Havana, Cuba.

F. E. Hurst, former assistant factory manager of the Chevrolet Motor Co., Flint, Mich., has joined J. L. Innes, his former chief, now vice-president and general manager of the Doble-Detroit Steam Motors Co.

Archibald R. Lemieux, for nine years connected with the Ansonia Mfg. Co., Ansonia, Conn., has been elected vice-president and general manager of the Worcester Mfg. Co., Worcester, Mass.

August Mertes, for several years superintendent of the works of the Pittsburgh Machine Tool Co., Braddock, Pa., has resigned to accept a similar position with the Bradney Machine Co., Middletown, N. Y., builder of locomotive cranes, elevating machinery, and machine shop tools. James Weeks, formerly with the Union Switch & Signal Co., Swissvale, Pa., has been appointed to succeed him.

G. A. Harris, chief engineer American Steel Export Co., will deliver an address on "The Opportunities for the American Engineer in the Export Field," at a meeting of the New York chapter of the American Association of Engineers, to be held at the Hotel McAlpin, New York, May 22 at 8 p. m.

R. L. Bieber has been appointed cashier of the Bethlehem, Pa., plant of the Bethlehem Steel Co., succeeding Roy E. Woodling, who has been appointed supervising cashier of the Bethlehem Steel plants and the Bethlehem Shipbuilding Corporation.

C. E. Scheuring, formerly manager of the Weil Boiler Co., Indianapolis, has been appointed superintendent of the Fort Wayne plant of the American Road Machinery Co. Mr. Scheuring succeeds E. E. Berry, who has been made chief engineer. Mr. Berry will have charge of all the company's engineering departments and will be located at the main office, Kennett Square, Pa.

Carl B. Ely, for two years superintendent of the bridge department of the Steelton, Pa., plant of the Bethlehem Steel Co., has been granted an indefinite leave of absence and left last week for Washington to accept a position in the Aviation Division of the Signal Corps of the United States Army. He will be engaged in construction work. John H. Myers, assistant superintendent, has succeeded him.

H. H. Hummel has assumed his duties as sales agent in charge of the machinery department of the Bethlehem, Pa., plant of the Bethlehem Steel Co., succeeding A. E. Weingartner, who has been transferred to the general superintendent's department.

JOBBERS MEET MR. REPROGLE

Confer with Director of Steel Supply on Situation They Are Facing

A conference between representatives of the steel jobbing trade and J. Leonard Repogle, director of steel supply for the War Industries Board, was held in Washington last week, the jobbers being anxious to find out where they stand with respect to the Government's requirements of the steel makers that they give 100 per cent of their output for war work.

Mr. Repogle pointed out the acute needs of the Government for steel, and said that while there was no desire on the part of the Government to interfere with the function of the jobber, whose service to war industries he fully recognized, the Government's immediate needs must come first. It is probable that the jobbers will be taken care of in some way, particularly where they can show that the steel they are allotted is to be used directly for Government work.

Joseph T. Ryerson & Son, Chicago and New York, have sent the following letter to their customers apropos of the present jobbing situation:

Supplementing our general letter of Dec. 8, 1917: There have been certain developments in the steel situation, during the past few days, which should be of vital importance to you. The shortage of steel in all lines has become much more acute than generally anticipated, due to the constantly increasing demands of the Government.

A representative of the Government has most emphatically stated to the steel manufacturers that the entire steel output of this country must from now on be devoted to the needs of the United States Government and its Allies in the prosecution of the war. This means that all business not intended for direct or indirect Government work must be subordinated to Government orders. We have joined with the steel industries in an agreement to carry out this policy as long as it may be necessary to assist in furthering the Government's war program.

We will do our utmost to handle the legitimate requirements of our customers, as in the past. Orders for material required for war work and public necessities will have prompt and immediate consideration, but all others must be subordinated to them. In order to avoid delay, we ask that you send with all orders and inquiries all the information possible as to the ultimate use of the material. If needed for Government use, please advise Government order number and state, also, under which of the following classifications the work comes: Ships; aircraft; munitions, military and naval supplies and operations. If material is not for Government use, give us accurate and detailed information as to its ultimate use, as there are many most essential industries, necessary to the welfare of the country to-day, whose requirements should be given every consideration after the needs of the Government.

We earnestly ask your full co-operation in this matter, as it is an obligation resting on all of us to join in any movement which may help in winning the war.

Lake Ore Movement in April

Iron-ore shipments from the Lake Superior region in April were better than in April, 1917, when they were the lowest in four years. The following table gives the shipments from the various ports in the last three years:

	April. 1915	April. 1916	April. 1917	April. 1918
Escanaba	49,307	398,214	190,407	.....
Marquette	4,438	53,258	.....	10,708
Ashland	43,949	147,852	.....	.....
Superior	87,175	211,340	21,125	99,562
Duluth	174,989	538,281	.....	56,991
Two Harbors	143,974	309,466	.....	68,609
Total	503,832	1,658,411	211,532	235,870
Decrease from 1916	.....	.....	1,446,879	.....
Increase from 1918	.....	.....	.....	24,338

The increase in 1918 over 1917 is 11.58 per cent, with the total still much less than in either 1916 or 1915.

High Cost of Locomotives in England

The extent to which the cost of locomotives has increased in England is shown by the fact that the Taff Vale Railroad recently placed orders for some new locomotives which it is stated will cost £7,000 each instead of a pre-war price of £2,300.

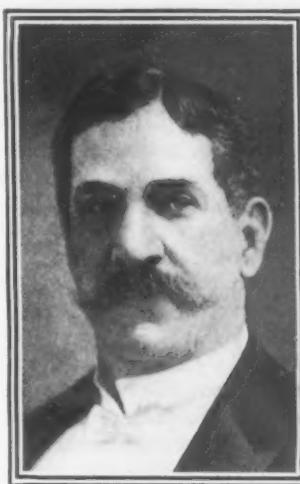
OBITUARY

JOHN GORDON BATTELLE, former president Columbus Iron & Steel Co., died at his home in Columbus, Ohio, May 10, within two days of his seventy-third birthday, after an illness of about a week of bronchial pneumonia. Colonel Battelle was born in Clarksburg, Va., May 12, 1845, and was educated at Fairmont Academy, Wheeling. In 1867 he became secretary and general superintendent of the Norway Mfg. Co., Wheeling, and in 1869 superintendent of the Memphis Rolling Mill Co., Memphis, Tenn. Later he was engaged in the manufacture of cotton presses at Brooklyn, N. Y. In 1883 he removed to Piqua, Ohio, and became vice-president and general manager of the Cincinnati

Corrugating Co. and president and general manager of the Piqua Rolling Mill Co. After the sale of the Piqua plants to the American Sheet Steel Co. he became vice-president of the latter and later of the Columbus Iron & Steel Co., which in 1917 was absorbed by the American Rolling Mill Co., Middletown, Ohio. Colonel Battelle retired from business about a year ago. He was commissioned a colonel in the Ohio National Guard by Governor Nash.

EARL TRUMBULL WILLIAMS, First Lieutenant 301st Field Artillery and vice-president J. H. Williams & Co., manufacturers of drop forgings, Brooklyn, N. Y., died May 7. While visiting friends in Northampton, Mass., May 6, he was struck by a limb torn from a tree during a storm. Lieutenant Williams was the younger son of Harriet Trumbull Williams and the late James Harvey Williams of Brooklyn. He graduated from Yale University in 1910 and entered the business founded by his father in 1883. When their plant at Buffalo, N. Y., began operations in 1914, he assumed charge of it as vice-president, and was in active control until the summer of 1917 when he entered the Officers' Training Camp at Fort Niagara. He was commissioned in November and assigned to duty at Camp Devens, Ayer, Mass. He was an ex-member of Squadron A, New York, and a member of the Saturn and the Country Clubs of Buffalo. His mother, a brother, and a sister survive him.

CHARLES S. POWELL, for a number of years connected with the Cleveland and London, Eng., sales offices of the Westinghouse Electric & Mfg. Co., died May 11, age 47 years. In 1902 he was transferred to that company's London office and a few years later returned to Cleveland, where he had been engaged in business as an electrical engineer. Mr. Powell graduated from Ohio State University in 1893. He had been in ill health for several years.



COL. J. G. BATTELLE



EARL T. WILLIAMS

New Ordnance Plant on Neville Island

Official Announcement of the Co-operative Plans of the Government and United States Steel Corporation

WASHINGTON, May 13.—In confirming officially the announcements exclusively made in **THE IRON AGE** of April 11 and 18 concerning the plans of the Government to build in cooperation with the United States Steel Corporation a mammoth arsenal, presumably in the Pittsburgh district, the Secretary of War describes briefly what will doubtless rank as the most extraordinary arrangement the Government has yet made with a private business concern for the production of war material. In brief, the Steel Corporation is to construct and operate the largest gun and projectile factory in the country without a penny of profit either upon the construction work or the output of the plant and in addition will provide the administrative supervision by detailing for the purpose the most accomplished experts now in the service of the corporation or its subsidiaries. Secretary Baker's formal announcement is as follows:

The Secretary of War has entered into an arrangement with the United States Steel Corporation by which that corporation undertakes to construct and equip for the Government a modern ordnance plant upon a site located in the interior of the country, to be selected.

A committee formed from officers of the corporation and its subsidiary companies, men fitted by education and experience, will be in immediate charge of the work. These men will receive no compensation for their services. The plant is to be built, equipped, and operated at the expense of the Government by the United States Steel Corporation without profit. Cannon of the largest calibers will be manufactured, as well as heavy projectiles in large quantities.

While the United States Steel Corporation, like other steel manufacturers, are full of work, and have always gladly undertaken production of finished materials wanted by the Government, they were persuaded by the Secretary of War to undertake this additional task which they patriotically agreed to do, and have placed their best energies and the strength of their economic position at the disposal of the War Department.

The site of the new arsenal has not yet been announced by the War Department but, as heretofore stated in this correspondence, ordnance experts believe that the requirements of the establishment cannot easily be met outside the Pittsburgh district. While several sites in that district are under consideration the general drift of expert opinion is toward Neville Island. It is true there is some criticism of this location on the ground that it is not sufficiently large to provide commodiously for the various units of the arsenal which will include blast furnaces, steel works, forge shops larger than any in existence, facilities for the heat treatment of forgings of the largest dimensions and shops for the machining and assembling of large numbers of guns of the heaviest calibers. Separate buildings will also be provided for the projectile factory which will be designed to have an output greater than any establishment now in existence in this country.

Detailed estimates of the cost of the new arsenal have not yet been worked out but in the figures presented to Congress by the Secretary of War during the past week a provision has been included to cover such costs as will have to be met during the fiscal year beginning July 1, next. Taking account of auxiliary

appropriations, the Ordnance Department will probably have at its command between four and five billion dollars which will be available for construction as well as production.

It is understood here that an unusual arrangement will be made for the governmental supervision of the new arsenal. While it will be operated by the experts of the Steel Corporation a corps of ordnance officers will also be assigned for duty at the big plant in a capacity somewhat different from that of the inspectors now serving at private munition plants. This corps will be made up of the most accomplished men in the Ordnance Department and will be recruited from time to time by bringing back from France artillery officers who have had experience at the American arsenal base now being constructed in that country and on the firing line. The fact that the Government is to pay all expenses of constructing and operating the new arsenal will make it necessary to assign to the plant a large staff of cost accountants, who will work with the office force of the Steel Corporation in keeping track of expenditures.

Reports to the effect that the new arsenal will be under the supervision of General William Crozier, Chief of Ordnance, now temporarily detailed for service on the War Council, are not well founded. General Crozier has recently devoted his time almost entirely to studying the ordnance problems arising in connection with the equipment of the American arsenal base in France and the practical work of the American artillery at the front. He has also made a careful survey of the practice in the French and British arsenals and gun factories and the results of his investigations will be utilized in all branches of the Ordnance Department. As he is now eligible to retirement on account of age, it is unlikely that he will be chosen to oversee the new arsenal.

Assistant Secretary of War Stettinius has issued a vigorous denial of the statement published in the daily press during the past week to the effect that he has been appointed to the post of "gun dictator." General Williams, the new Acting Chief of Ordnance, is in charge of guns and all ordnance material. He has just returned from France.

General Wheeler, who was appointed Acting Chief of Ordnance when General Crozier was assigned to the War Council, has gone to France for service in connection with the American arsenal base. W. L. C.

The Steel Corporation's Announcement

In making public the decision to undertake gun and projectile manufacture for the Government, Chairman Gary of the Steel Corporation said that the plant would be "for the manufacture of cannon and projectiles of large sizes and in great quantities" and added:

The work will be in the immediate charge of a committee consisting of a vice-president and the controller of the corporation, and eight others designated from the officers (presidents or vice-presidents) of the various manufacturing subsidiary companies, and all selected because of their education, experience, and peculiar fitness. This committee will keep in close touch with the building and operating organization which is being formed, and with the officers of the Steel Corporation and with the War Department.

Officers of the corporation and of the subsidiary companies will receive no compensation for their services. Accurate books of account will be kept which, with all records,

files, and other documents and papers, will be open and subject to examination by Government officials or other properly appointed representatives.

General plans are being rapidly prepared and will soon be ready for examination by the Ordnance Department or other bureau, and, when approved, the corporation will be given a free hand in construction and operation, holding itself responsible for the faithful performance of the duty imposed by the terms of the contract.

Neville Island the Chosen Site

Announcement was made at Washington on Tuesday, May 14, that Neville Island in the Pittsburgh district had been selected as the site for the new ordnance plant which the United States Steel Corporation will build for the Government. The cost is now estimated at \$60,000,000 to \$70,000,000. The 14-in. and 16-in. guns which are to be the main product will not be turned out in quantity until the latter part of 1919. Shells up to 12 in. will be manufactured in the projectile plant.

The American Steel & Wire Co. secured Neville Island as a site for blast furnaces, steel works, rod and wire mills in 1900. One blast furnace was built and ground was laid out for others. Meanwhile, however, the United States Steel Corporation was formed, and the American Steel & Wire Co. being taken over, all work at Neville Island was stopped. In 1908 the Carnegie Steel Co. acquired the Neville Island furnace from the American Steel & Wire Co. in an exchange of furnaces in the Pittsburgh district between the two companies. The island is located in the Ohio River about six miles northwest of the point of confluence of the Allegheny and Monongahela rivers. It contains about 1000 acres and its greatest extent is in the direction of the course of the river, the width of the island averaging about one-eighth of its length.

MEN RETURN TO WORK

Serious Labor Trouble at Bridgeport Averted After Patriotic Appeal

A threat of serious labor trouble in munitions plants in Bridgeport, Conn., has been temporarily removed by the vote of the men to return to work, after listening to an address by Major D. A. Rogers, Ordnance Department, last Friday night. The trouble was due largely to the activities of a local organizer of the Machinists' Union and was not endorsed by the officers of the International Association of Machinists, who were instrumental in getting the men to return to work and await the decision of the federal authorities.

In all, more than 700 toolmakers were out, including men from the Remington Arms Union Metallic Cartridge Co.; Liberty Ordnance Co.; Anderson Die & Machine Co.; Bradley Machine Co.; Bridgeport Gun & Tool Co.; Feeney Tool Co.; Electric Compositor Co.; Harris Engineering Co.; Lindstrom Die, Tool & Gauge Co.; Modern Mfg. Co.; Model Tool & Gauge Co.; Pederson Brothers; Precision Tool & Gauge Co.; W. T. Smith Mfg. Co.; F. S. Trumbull Co.; and Bridgeport Machine Tool Co. It is reported that most of the smaller plants were affected because they were working on subcontracts from the Remington Co.

The demands of the men were:

First—That a minimum rate per hour of 80 cents be established for all toolmakers.

Second—That a minimum rate per hour of 70 cents be established for all machinists.

Third—Apprentices shall not be less than 15 or more than 21 years of age at the beginning of their four years' term, which should be completed in the shop where apprenticeship is started.

There may be one apprentice to every five journeymen machinists employed. Apprentices shall have a definite agreement as to their apprentice conditions and to be given an opportunity to work at all branches of the trade.

Fourth—None but members of the International Association of Machinists are to be employed in this plant.

The attitude of the Ordnance Department was expressed in a message from Brigadier General C. C. Williams, Acting Chief of Ordnance, to Waldo C. Bryant, district ordnance chief at Bridgeport:

We learn with extreme regret that strikes are contemplated in Remington Arms shops and several other shops manufacturing munitions which are needed immediately by Pershing's soldiers in France. In view of the fact that the Government has an adjustment under way and also in view of the extremely grave situation existing in France, every loyal American employed in these shops has an obligation to the Government and its army in France to keep production going. In view of these facts we expect the men to stand by the Government and continue at work pending an adjustment.

The men return without conditions to await the report of the National War Labor Board which is to be made before June 1. The Government is making an extensive investigation of the wages paid to various trades employed upon munitions work in southern New England. This work has been under way for some time and it is expected that it will result in the setting of rates for the entire district covered by the investigation. Votes on sympathetic strikes of toolmakers at the Locomobile Co. of America, the Lake Torpedo Boat Co. and the Bullard Machine Tool Co. have been deferred.

Chairman of Policies Board

Felix Frankfurter, formerly an instructor in law at Harvard University and later an assistant to Secretary of War Baker, has been appointed chairman of the new Policies Board of the War Labor Administration. It is announced that Mr. Frankfurter will co-ordinate industrial sections of the War and Navy Departments, Shipping Board, Department of Agriculture and the War Industries Board. Heretofore, all of these departments had acted independently in obtaining their labor supply and in making wage awards. In accepting his new position, Mr. Frankfurter said:

Production is vital to the winning of the present battle and uninterrupted maximum production for the winning of the war. There must be an adequate labor supply, wisely distributed, to meet the needs of war industries. There must be sound and just conditions under which labor is employed.

The grave abuses of labor turn-over, resulting in inefficiency and discontinuity of employment, must be stopped at once and this can be done only by stabilizing conditions.

Responsibility for securing these results has been heretofore vested by the President in Secretary Wilson as Labor Administrator. Secretary Wilson has asked me to assist him in carrying out this task. The assurance of heartiest cooperation has been given by the War Department, the Navy Department and the Fleet Corporation. I shall have the benefit of the experience and support of the able industrial services of the different departments of the Government, as well as the help that will come through familiarity recently gained abroad with the way England and France deal with similar problems.

The striking cranemen and other workmen at the Pittsfield, Mass., plant of the General Electric Co. have returned to work awaiting adjustment of their grievances by the National War Labor Board. The cranemen originally asked for a 20 per cent increase, but later withdrew that demand and asked for the same wages as paid to cranemen in the shipyards.

Col. Jay E. Hoffer, commanding officer, Springfield, Mass., Arsenal, has announced a wage increase of approximately 10 per cent for all day workers. The increase dates from May 9 and affects about 2500 employees. Piece workers are not included in the new arrangement.

To meet the demands made upon it for Government work the Lebanon Steel Foundry Co., Lebanon, Pa., has let contracts for the erection of an annex, 100 x 200 feet. The new plant is to be in operation in six months and will afford employment for 250 men. Since the beginning of the war, it has been engaged almost exclusively on Government work making gun-carriage, gun-mount and truck castings. The company was organized in 1912 by Thomas Quinn and W. H. Worrell.

Machinery Markets and News of the Works

SHIPBUILDERS BUYING

Expansion of Work in Many Yards

Railroads Are Also Coming Into the Market for Shop Equipment

From all sections come reports of shipbuilding expansion. New yards are being established and the older companies are adding to their equipment so that ship construction may be speeded up. The Carolina Shipbuilding Corporation, 415 Broadway, New York, which will build fabricated ships at Wilmington, N. C., has issued a list of equipment it will buy. The William Cramp & Sons Ship & Engine Building Co., Philadelphia, has issued a list of 18 cranes, the largest crane list received in the New York market in several months. The Federal Shipbuilding Co., New York, is inquiring for four cranes. The Foundation Co., New York, is inquiring for fabricating machinery for a new yard. The Terry Shipbuilding Corporation, New York, will buy three cranes for its yard in the South. The Vulcan Iron Works, Jersey City, N. J., has bought machine tools for a new shop to be used for the manufacture of marine engines. Shipbuilding companies have placed orders with Cincinnati machine-tool builders. The Wisconsin Shipbuilding & Navigation Co. has been or-

ganized to build steel ships for ocean service at Milwaukee. The Pacific Northwest expects an expansion of the wooden ship program.

Railroads are also coming into the market, the Chicago, Burlington & Quincy Railroad having started to place orders in Chicago for about \$350,000 to \$400,000 worth of shop equipment. The Central Railroad of New Jersey has issued a list of about 100 machines and the New York Central is expected to issue a list shortly.

Tractor manufacturing is being expanded. The International Harvester Co., through its Chicago office, is getting quotations on about \$1,500,000 worth of machine tools for its tractor plant. The American Tractor Co., Peoria, Ill., a newly organized company, probably will be a buyer in the near future. The Holt Mfg. Co., Peoria, which has large Government orders for caterpillar tractors, is making plans for another factory.

Ordnance work calls for many tools. The Watervliet Arsenal, Watervliet, N. Y., placed additional orders last week. The Ingersoll-Rand Co., New York, is expected to buy tools this week for making recoil mechanisms for 75-mm. guns. The Raymond Engineering Corporation, New York, bought tools last week for the manufacture of gun sights. That production of field artillery is now proceeding is indicated by the report from Milwaukee that the Wisconsin Gun Co. is now turning out three 3-in. guns a day.

New York

NEW YORK, May 14.

Shipbuilding activities are being speeded up in every possible way since Charles M. Schwab became director general of the Emergency Fleet Corporation, and this has resulted in considerable new buying of fabricating equipment, machine tools and electric cranes by various shipyards. The Carolina Shipbuilding Corporation, 415 Broadway, New York, which is backed by the George A. Fuller Co., 175 Fifth Avenue, New York, has issued a fair-sized list of punches, shears, and other fabricating equipment and machine tools. Cranes will probably also be purchased soon. Its plant will be located at Wilmington, N. C. The William Cramp & Sons Ship & Engine Building Co., Philadelphia, has issued a list of 18 cranes it expects to buy. One 70-ton, five 30-ton, one 25-ton, one 10-ton, and 10 5-ton are listed. The Federal Shipbuilding Co., New York, has inquired for four 10-ton cranes, with 5-ton trolleys, 70-ft. span, for its plant at Kearny, N. J. The New York Shipbuilding Corporation, Camden, N. J., has received quotations on additional fabricating equipment. The Terry Shipbuilding Co., Grand Central Terminal, New York, is inquiring for three cranes, 10 to 20 tons' capacity, for its shipyard in the South. The Virginia Shipbuilding Corporation, Alexandria, Va., bought machine-shop equipment last week. The Foundation Co., Woolworth Building, New York, is inquiring for fabricating machinery for a new shipyard. There is also a good deal of buying in small lots by many other shipyards and by companies which have contracts for engines, boilers and other ship parts. The Vulcan Iron Works, Jersey City, bought tools last week to equip a new shop for the manufacture of engines for merchant ships. A new boiler shop will also be constructed, equipment for which will be bought soon.

The Ingersoll-Rand Co., New York, is reported to have closed a contract with the Ordnance Bureau, War Department, for the manufacture of recoil mechanisms for 75-mm. guns, and will probably buy the necessary machine tools this week. The Marlin-Rockwell Corporation, New Haven, Conn., has placed a number of tools for toolroom equipment in this market. The Worthington Pump & Machinery Cor-

poration, New York, has bought a small list of tools for its Harrison, N. J., plant, and Deane Works, Holyoke, Mass.

Railroads are now coming into the market, the Central Railroad of New Jersey having issued a list of about 100 machines of various types for repair shops. The New York Central, it is reported, will also issue a list of requirements. Many of the Eastern roads are expected to buy in order to speed up repair work on rolling stock. Practically all of the car builders have come into the market for forging and rivet machines as the result of the placing of orders for 100,000 cars by the Railroad Administration. The Standard Stoker Co., Grand Central Terminal, New York, which will build mechanical stokers for locomotives, has bought a part of its requirements for a shop at Erie, Pa.

The Watervliet Arsenal, Watervliet, N. Y., continues to be a large buyer, having closed for considerable equipment in the past week for gun work. The Atlantic Loading Co., which is building a shell-loading plant near Hammonton, N. J., will come into the market shortly for cranes and hoists and other equipment. Its office has been removed to the Lafayette Building, Philadelphia. Army officers are in charge of the work.

The Standard Oil Co. of New York, 26 Broadway, New York, is inquiring for fabricating equipment and machine tools for a new refinery and tank plant to be built at Providence, R. I.

The Raymond Engineering Corporation 309 Lafayette Street, New York, bought tools last week for the manufacture of gun sights. The Baush Machine Tool Co., Springfield, Mass., will buy about 15 tools, mostly thread millers, for its worm-gear department.

The Reliance Fertilizer Co., Savannah, Ga., has inquired for two cranes with 2½-yd. grab buckets, 40 and 80 ft. span. The Thompson & Starrett Co., New York, wants four special cranes and a number of monorail hoists for the powder plant it is building for the Government. The American Locomotive Co. has inquired for one 15-ton crane for its Schenectady works. The Brooklyn Navy Yard will buy a pillar crane. Mitsui & Co., New York, have purchased from the Northern Engineering Co. two 11½-ton cranes for

export to Japan. J. N. Kinney, New York, has sold eight chain hoists with trolleys to the Thompson & Starrett Co., New York.

Several of the crane builders have issued instructions to their selling agents to take no orders from companies that cannot produce priority certificates. This is based on the expectation that they will not be able to procure steel except for Government work.

To provide additional manufacturing space, the Hyatt Roller Bearing Co., Harrison, N. J., has recently removed its industrial bearing division to its New York offices. The local works now comprise twenty-two plant buildings.

The Federal Shipbuilding Co., Kearny, N. J., is said to be negotiating for about 88 acres additional to the 21 acres at the foot of Yale Street, Jersey City, just acquired.

The Spicer Mfg. Co., South Plainfield, N. J., is planning a one-story addition to its power plant.

C. A. Goldsmith, 42 Cutler Street, Newark, N. J., will build a one-story brick addition, 50 x 150 ft., to his brass foundry at Avenue D and Thomas Street, to cost about \$24,000.

The Kyle & Purdy Shipbuilding Co., City Island, N. Y., has awarded final contracts to Post & McCord, 101 Park Avenue, New York, for an addition to its plant on King Avenue, to cost about \$150,000. It will be three stories, 60 x 180 ft.

The Fulton Steel Corporation, 165 Broadway, New York, has had plans prepared for a one-story addition to its foundry at Fulton, N. Y.

The Kerr Turbine Co., Wellsville, N. Y., has increased its capital from \$500,000 to \$2,000,000.

The General Electric Co., Schenectady, N. Y., is reported considering the erection of three new additions to its works.

Alexander McDonald, operating a boat-building plant at 2855 Richmond Terrace, Mariner's Harbor, West Brighton, S. I., has acquired a tract of waterfront adjoining, part of which will be used for a new machine shop and auxiliary shop buildings.

The Knabenshue Mfg. Co., East Northport, L. I., has been incorporated, with a capital of \$100,000, by C. C. Gales, A. R. Knabenshue and F. D. Kohler, 84 Livingston Street, Brooklyn, to manufacture aircraft.

Herman J. Hegt, Inc., New York, has been incorporated, with a capital of \$100,000, to manufacture metal goods. H. J. Hegt and J. F. Ross, 309 Broadway, and J. J. Hegt, 32 Broadway, are the incorporators.

The American Standard Gage Mfg. Co., New York, has been incorporated, with a capital of \$50,000, by M. R. Bookman, M. and E. L. Stern, 41 Maiden Lane, to manufacture tools, dies, etc.

The James A. McCafferty & Sons Mfg. Co., 505 Driggs Avenue, Brooklyn, manufacturer of dry batteries, etc., has awarded contract to W. Southall, 23 Haverkamp Street, Middle Village, L. I., for an addition to its plant on Haverkamp Street, Middle Village, estimated to cost \$50,000.

The Federal Steam Clothes Press Co., Inc., New York, has been incorporated, with a capital of \$200,000, by S. J. Carter, Jesse E. Kingsley, and Corry S. Griffin, Syracuse.

The New Device Corporation, New Brighton, S. I., has filed articles of incorporation, with a capital of \$60,000, to manufacture a patented spelling machine. R. E. Harper, 72 Trinity Place, New York; A. C. Gross, 683 Broadway, New York; and H. C. Davis, 8 Stuyvesant Place, New Brighton, are the incorporators.

The Clark Electric & Mfg. Co., 149 Broadway, New York, will build a one-story addition, 35 x 45 ft., to the factory recently acquired at 22-26 Vanderbilt Avenue, near Flushing Avenue, Brooklyn. The present building is about 75 x 100 ft. The company also operates a plant at 2 Lombardy Street, Brooklyn.

Samuel Singer, 1872 Second Avenue, Brooklyn, has had plans prepared for a one-story metal smelting works, 20 x 100 ft., on Second Avenue, near Fifteenth Street.

The D. & P. Vacuum Governor Co., New York, has been incorporated, with a capital of \$100,000, to manufacture specialties for automobile engine use. A. J. Donovan and E. J. Donovan, 50 Church Street, New York, are the incorporators.

The New York Concrete Ship Corporation, New York, has been incorporated, with a capital of \$100,000, by C. F. Hinman, M. L. Farrington and W. E. McNeillie, 507 West 140th Street.

A one-story boiler shop, 60 x 400 ft., will be erected by the Standard Shipbuilding Co., 44 Whitehall Street, New York, at its plant on Shooters Island, Staten Island.

The Crowell Mfg. Co., 298 Paaffe Place, Brooklyn, manu-



The Hurlburt Motor Truck Co. needed badly a boring mill which weighed 15,000 lb., and with the extras almost 9 tons. The mill was made for the company by the Bullard Machine Tool Co., Bridgeport, Conn., 56 miles from the plant. One afternoon it was decided the mill must be obtained and a 7-ton truck left the plant and was back the same afternoon, having covered 112 miles and hauled the load on the return trip.

facturer of air pumps, etc., has increased its capital to \$40,000.

The United Vapor Heat Co., New York, has been incorporated, with a capital of \$50,000, by M. E. Cullen, 2574 Bedford Avenue, Brooklyn; E. R. Vail, 740 West End Avenue, New York, and J. G. Gerhard, Hoboken, to manufacture heaters and oil vaporizing devices.

The Pro-Econ Foundries, Inc., Bloomfield, N. J., has been incorporated, with a capital of \$25,000, by William P. Baerenrodt, East Orange; and Arthur W. Schuller, Bayonne, to manufacture castings, copper specialties, etc.

The Wright-Martin Aircraft Corporation, New Brunswick, N. J., will build a two-story addition to cost about \$25,000.

The W. & A. Fletcher Co., 1301 Hudson Street, Hoboken, has awarded a contract to William Crawford, 7 East Forty-second Street, New York, for a three-story addition, 50 x 150 ft., to its marine engine and boiler works, to cost \$40,000.

The Central Railroad of New Jersey, Communipaw Avenue, Jersey City, N. J., will build a one-story addition to its power plant, to cost about \$50,500. The company has also awarded a contract to the Robins Conveying Belt Co., 13 Park Row, New York, for the installation of a belt-conveying system for coal service, at a cost of \$66,686.

Rowe & Davis, 1066 East Grand Street, Elizabeth, N. J., will build a one-story machine shop, 25 x 100 ft., to cost \$10,000.

The Interstate Smelting & Refining Co., Newark, N. J., has been incorporated, with a capital of \$100,000, by P. I. Cohn, Fred W. Wuensch and Arthur A. Blaicher, to operate a metal works.

The plant of the Newark Instrument Co., 101 Halsey Street, Newark, N. J., will devote its output to the manufacture of altimeters for aeroplanes for the Government. In arranging for the production of the works the Government has assumed a chattel mortgage of \$90,000 on the tools, equipment, fixtures, etc.

Plans are being prepared for a one-story addition, 120 x 175 ft., to be made to the boiler shop of the American Locomotive Co., Schenectady, N. Y.

Graf & Rejall, Inc., New York, has been incorporated with a capital of \$200,000, to manufacture iron, steel and copper specialties. W. E. Rejall, 54 Tompkins Place, Brooklyn; J. J. Graf, 493 Park Avenue, Richmond Hill, and E. C. Miller, 203 Broadway, New York, are the incorporators.

The Eberhard Faber Pencil Co., 39 Greenpoint Avenue, Brooklyn, has awarded a contract to Curtis Woodruff & Co., Tenth Street, Long Island City, for a one-story brick addition, 70 x 190 ft., on Franklin Street, to cost \$18,000.

The Parisano Air Plane Corporation, New York, has been incorporated with a capital of \$115,000 by G. McLean, W. Fahnestock and M. A. Parisano, 256 West Thirty-eighth Street, to manufacture aircraft.

The M. Walden Butler Co., Brooklyn, has been incorporated with a capital of \$50,000 to manufacture metal airplane parts and other equipment. H. Walden and L. Green, 292 Fifth Avenue, New York, are the incorporators.

The John Polachek Bronze & Iron Co., Hancock Street, Long Island City, N. Y., manufacturer of architectural bronze and iron specialties, is having plans prepared for a

one-story brick and concrete foundry, 75 x 100 ft., to cost about \$35,000. A two-story addition, about 50 x 80 ft., for general ironworking, is also planned.

The Sprague Electric Works of the General Electric Co., Bloomfield, N. J., has awarded a contract to the Austin Co., Philadelphia, for the construction of a one-story brick and steel assembling plant, 100 x 180 ft., to cost \$35,000.

The Westville Boat Building Co., Westville, N. J., has been incorporated with a capital of \$50,000, by J. O. Hofberg, Westville; George Prifold and Waldemar W. Berg, Marcus Hook, Pa.

The American Spark Plug Co., Bloomfield, N. J., has been incorporated with a capital of \$125,000 by Joseph S. Fauth and Samuel R. Kerlin, Bloomfield, and Robert Macdonald, East Orange.

The Thomas Moore Trench Machine Co., Rockaway, N. J., has acquired the property formerly owned and occupied by the Lincoln Iron Works, and will establish a plant for the manufacture of trench machines. It is proposed to first remodel the buildings. Thomas F. Moore is president.

The Anchor Post Iron Works, 165 Broadway, New York, manufacturing wire fence, etc., at Garwood, N. J., has increased its capital from \$140,000 to \$650,000.

The plant of the George Benda Bronze Powder Co., Boonton, N. J., largely German owned, has been taken over for operation by A. Mitchell Palmer, Alien Property Custodian.

The Bergen Point Iron Works, foot of West Fifth Street, Bayonne, has filed plans for a one-story addition to cost about \$8,000. A new crane runway will also be constructed.

The Bayonne Ship Repairing Co., North Arlington, N. J., has been incorporated with a capital of \$50,000 to construct and operate a plant at Bayonne. Matthew Barr, 2 Morgan Place, and Oluf Nielson, 76 Melrose Avenue, North Arlington, and Leonard A. Wimmer, Kearny, are the incorporators.

Henry Steers, Inc., Bayonne, operating a barge-building works, is arranging for the building of two finished boats a week. Extensions are being made at the works to facilitate operations. The company is now giving employment to about 600 men and expects to increase this number to 1000. Contract has been received for 50 barges for the Government.

The Hudson Pump Co., Hoboken, has been incorporated with a capital of \$10,000 by John J. Marnell, Francis T. Morgan and A. B. Borrack, Hoboken, to manufacture pumps, etc.

The Moran Iron Works, Jersey City, manufacturer of ship fittings, etc., has acquired by the purchase of its president, Joseph F. Moran, Brooklyn, N. Y., the 12-acre baseball park adjoining its works. It plans to erect an addition to its plant on the new site.

The New Jersey Car Spring & Rubber Co., Jersey City, operating a plant at Wayne and Brunswick streets, has filed articles of incorporation with a capital of \$1,000,000. W. M. Pepper is the principal incorporator.

The Erie Railroad Co., Jersey City, has filed plans for a one-story machine shop at 206-20 Provost Street to cost \$15,500.

The Central Stamping Co., 591-609 Ferry Street, Newark, manufacturer of tin and enameled ware, has awarded contract to the John W. Ferguson Co., 152 Market Street, Paterson, for an addition to its enameling works, 140 x 250 ft., to cost about \$50,000.

The Federal Tool & Machine Co., 24 Scott Street, Newark, has increased its capital from \$10,000 to \$50,000.

The Western Tool Co., 217 High Street, Newark, operating a second plant at 253 South Street, has purchased a four-story factory at 571 Third Street for another branch works.

The Board of Commissioners, City Hall, Newark, will receive bids until 11:30 a. m., May 16, for furnishing one 50-hp. motor-generator set, etc. Morris R. Sherrerd is chief engineer.

The American Tool & Machine Co., Newark, has leased a floor at 870-76 Broad Street for extensions.

The Essex Foundry, Murray Street and Avenue D, Newark, manufacturer of cast-iron pipe, etc., has had plans prepared for a one-story brick addition, 41 x 75 ft.

William Dixon, Inc., 39 John Street, New York, manufacturer of jewelers' tools, etc., has leased a four-story factory of about 30,000 sq. ft. floor space at 34-36 East Kinney Street, Newark, and will establish a new manufacturing plant.

The National Oil & Supply Co., Newark, has purchased property on Hamburg Place and plans the erection of a new plant. It proposes to sell its present works on Lafayette Street.

The Machine Tool Engineering Co., New York, has been incorporated, with a capital of \$100,000, by L. S. Love, G. A. and E. L. Steinle, 101 West 109th Street, to manufacture machine tools.

The Carrie Gyroscopic Corporation, New York, has been incorporated, with an active capital of \$242,000, by C. H. Pond, R. C. St. George and F. G. Carrie, 311 West Ninety-fifth Street, to manufacture gyroscopes and kindred apparatus.

Buffalo

BUFFALO, May 13.

The Foster Specialties Co., Eighteenth Street, Buffalo, is planning a three-story addition to its mold shop, 50 x 250 ft., a one-story foundry and a six-story general manufacturing works.

Fire at the plant of the Oldman Boiler Works, 38 Illinois Street, Buffalo, May 5, caused a loss of about \$15,000.

An electric power plant will be constructed by the Buffalo Cereal Co., Buffalo, in connection with its new elevator to be erected on Elk Street and the Lake Shore Railroad, at a cost of about \$300,000.

The Buffalo Lens Mfg. Co., 507 Washington Street, Buffalo, has increased its capital from \$15,000 to \$450,000.

The O'Neil Iron Works, Perry Street, Buffalo, is having revised plans made for a one-story addition, 100 x 200 ft. The Lackawanna Bridge Co., Bell Street, has the contract.

J. H. Williams & Co., 400 Vulcan Street, Buffalo, manufacturers of drop forgings, have awarded contract to the John W. Ferguson Co., United Bank Building, Paterson, N. J., for the construction of four one-story additions, 60 x 240 ft., 20 x 65 ft., and smaller, to its plant on Kenmore Avenue, Tonawanda.

The Cochran-Bly Co., 15 St. James Place, Rochester, manufacturer of machine tools, will build a one-story addition, 48 x 70 ft.

The Hammond Steel Co., 1400 Milton Avenue, Solvay, N. Y., has increased its capital from \$150,000 to \$1,000,000.

The Buffalo Structural Steel Co., 166 Dart Street, Buffalo, has acquired about 5½ acres adjoining its plant, formerly held by the Standard Plaster Co., for extensions.

The Evans Devices Corporation, Buffalo, has been incorporated, with a capital of \$41,000, by M. C. Steinman, M. U. Greenville and M. J. Brazil, Buffalo, to manufacture addressing machines, automatic printing attachments, etc.

The Pierce, Butler & Pierce Mfg. Co., Syracuse, manufacturer of boilers and other heating specialties, is reported negotiating for the purpose of the Ames Iron Works, Oswego, N. Y., with about \$1,800,000 involved in the transaction. The plant of the Ames company occupies two blocks included between East Second and Third, Cayuga and Schuyler streets. The plant would be used by the new owner for the manufacture of large boilers and engines heretofore made by the Ames company. J. T. Duryea is president of the Pierce company.

Plans are being prepared for a foundry to be built by the Demarest Heating Corporation, Buffalo, John Demarest, 210 The Terrace, is president.

The Pierce-Arrow Motor Car Corporation, Buffalo, is building two small additions to its plant at Elmwood Avenue and the New York Central Railroad Belt Line.

The Cygnet Rear Car Co., Buffalo, which has Government contracts, has leased a five-story building at Perry and Indiana streets, containing 40,000 sq. ft., to be operated in addition to its plant on Niagara Street.

The Continental Can Co., Syracuse, N. Y., has let contract for a factory and power house of reinforced concrete to cost \$60,000.

The LaFrance Motor Truck Co., Elmira, N. Y., is taking bids for an addition to its plant.

New England

BOSTON, May 13.

The New Britain Machine Co., New Britain, Conn., has increased its capital stock from \$1,250,000 to \$1,500,000.

The Lake Torpedo Boat Co., Bridgeport, Conn., is to build two additions to its machine shops, 40 x 82 ft. and 24 x 40 ft., one story.

The A. S. Lauferty Co., Boston, has been incorporated with authorized capital stock of \$50,000 to manufacture telephone devices and apparatus.

The Liberty Shipbuilding Corporation, 95 Milk Street, Boston, has received contracts to build concrete ships at three Atlantic ports, Boston, Wilmington, N. C., and Brunswick, Ga.

The Emergency Fleet Corporation is having plans prepared for 200 houses to be built at Portsmouth, N. H., for employees of the Atlantic Corporation, shipbuilders.

The Maxim Silencer Co., Hartford, Conn., has awarded a contract to the Ellison Construction Co., for an addition, 30 x 300 ft., one story, at its plant on Homestead Street.

The Government has awarded a contract to the Casper Ranger Construction Co., Holyoke, Mass., for an addition, 34 x 87 ft., four stories, to the administration building at the Springfield Arsenal, Springfield, Mass.

The Narragansett Shipbuilding Co. has started work on a shipyard at Tiverton, R. I.

The North & Judd Mfg. Co., New Britain, Conn., has been granted permits to build three structures; a furnace building, 20 x 21 ft., and two storage buildings, 20 x 120 ft. and 20 x 80 ft.

The New Britain Tool Co., New Britain, Conn., has awarded a contract to William H. Allen for a factory in the rear of 52 Woodland Street, 40 x 50 ft., one story.

The Bilton Machine Tool Co., Bridgeport, Conn., has awarded a contract to John R. Sheehan for a storage building, 30 x 340 ft., one story.

The Premier Machine & Press Co., Boston, has been incorporated with authorized capital stock of \$1,000,000. The incorporators are Fisher H. Nesmith, Cambridge, Mass.; J. S. Stone, Wayland, Mass., and Alexander G. Grant.

Interests controlling the Cumberland Shipbuilding Co., Portland, Me., have purchased the Bancroft & Martin Rolling Mills Co. and will operate the plant in connection with the Cumberland shipyard.

The Worthington Pump & Machinery Corporation, Deane Works, Holyoke, Mass., has had plans drawn for an addition, 50 x 200 ft., to its foundry.

The B. F. S. Mfg. Co., Worcester, Mass., has been formed to build electric valve grinders and special machinery, by Bror F. Stenman, Carl W. Fors, Charles E. Mattson and J. Henry Lindberg.

Philadelphia

PHILADELPHIA, May 13.

Plans have been completed for a five-story and basement addition, 30 x 52 ft., to the plant of James F. Burns, 713-15 Cherry Street, Philadelphia, manufacturer of electrical specialties.

The Reid Metal Refining Co., Tioga and Tulip streets, Philadelphia, will build a one-story addition, 48 x 100 ft.

George W. Smith & Co., Inc., 3907 Powelton Avenue, Philadelphia, has commenced the construction of a one-story addition, 280 x 345 ft., to its woodworking plant, located on Forty-ninth Street, near Botanic Avenue, and estimated to cost \$150,000.

The Bureau of Yards and Docks, Navy Department, Washington, is taking bids for a new power plant at the League Island aircraft factory, Philadelphia.

The Philadelphia & Reading Railroad has had plans prepared for a one-story power plant, 45 x 78 ft., to be erected at its works, Tulp and Somerset streets, for plant operation.

The Mathis Yacht Building Co., Camden, N. J., affiliated with John H. Mathis & Co., Camden, operating a shipbuilding works, has increased its capital from \$50,000 to \$150,000.

The Reeves Engineering Co., Trenton, N. J., has been incorporated, with a capital of \$100,000, by William H. Plane, Trenton, and Frederick W. Child, Greenwich, Conn., to manufacture engines, etc.

The Industrial Foundry Co., Pottsville, Pa., has broken ground for a one-story foundry, 90 x 120 ft., to cost \$30,000.

The Wayne Brass Foundry Co., Aspinwall, Pa., has been incorporated, with a capital of \$50,000, by William J. Davis, Aspinwall, and others.

The Bonney Valve & Tool Works, Allentown, Pa., has taken out a permit to build a one-story brick addition, 60 x 220 ft., at Greenleaf and Race streets.

The Eddystone Ammunition Works, Eddystone, Pa., has awarded contract to R. H. Scroggins & Son, Wilmington, Del., for a one-story addition, 60 x 85 ft.

The Darling Valve & Mfg. Co., Williamsport, Pa., has been incorporated, with a capital of \$600,000, by Robert H. Therne and associates.

Baltimore

BALTIMORE, May 13.

The Baltimore Dry Dock & Shipbuilding Co., Baltimore, has awarded a contract to the West Construction Co., American Building, Baltimore, for a three-story addition to its plant at Locust Point, to cost about \$55,000.

The E. I. du Pont de Nemours Co., Wilmington, Del., will build a new powder plant at Tenderfoot Hill, Cripple Creek, Colo. Surveys have been inaugurated.

The Auto Knot Machine Co., Winston-Salem, N. C., has been incorporated, with a capital of \$100,000, by A. R. Eanes, Draper, N. C.; and E. L. Knight, Reidsville, N. C.

The Miller Valve & Brass Co., Macon, Ga., has been incorporated, with a capital of \$25,000, by Charles T. Miller, T. E. Ryals and J. W. Clisby, Macon.

The Maritime Engineering Corporation, Elizabeth City, N. C., has finished plans for the construction of its proposed shipbuilding plant on the Pasquotank River. A site has been purchased on Machelle's Island for the new works, which will be equipped to manufacture steel vessels. The company was recently incorporated with a capital of \$1,250,000. Russell B. Smith is president.

Cincinnati

CINCINNATI, May 13.

Automobile makers engaged in war work are inquiring for a number of machine tools. An increase in orders for small lathes and shaping machines is reported from scattered sources.

Shipbuilding firms have lately purchased a large number of machine tools. In most cases no general lists were sent out and buying was done through representatives who visited different plants to ascertain definitely what deliveries could be made.

At Dayton, Ohio, all plants are working on full time, and while there have been some labor disputes no serious trouble has developed, although some complaint is made as to the inability to speed up the workmen.

The King Machine Tool Co., Winton Place, Cincinnati, has increased its capital stock from \$50,000 to \$300,000. This was done for the purpose of taking over the plant now occupied and to provide for further possible extensions. E. A. Muller is general manager.

Work is progressing rapidly on the new plant of the A. V. Carroll Machine Tool Co. in Norwood, a Cincinnati suburb.

The John B. Morris Foundry Co., Cincinnati, has taken out a permit for improvements to its plant estimated to cost \$10,000. George McG. Morris is president.

The Warman Aluminum Castings Co., Cincinnati, has leased a building at Main and Lexington avenues, Norwood, which is being equipped for making aluminum castings.

The Black & Clawson Co., Hamilton, Ohio, builder of paper-making machinery, has awarded contract to the Bert L. Baldwin Co., Cincinnati, for an addition to its foundry, 60 x 80 ft., one story, and of brick and steel.

The Liberty Tool & Production Co., Dayton, Ohio, is installing additional equipment in its plant in the Callahan Power Building. H. L. Beeler is secretary and treasurer.

The Herman Tire Building Machine Co., Columbus, Ohio, has been incorporated with \$10,000 capital stock by W. H. Herman and others. No manufacturing details have been announced.

The Halfaker Mill Work Co., Columbus, Ohio, has been incorporated with \$10,000 capital stock by O. W. Halfaker and others.

The Columbus Steel Products Co., Columbus, is remodeling a building at 172 West Locust Street and will soon remove its plant from Beach City, Ohio, to the new location.

Milwaukee

MILWAUKEE, May 13.

A flood of orders and inquiries for single tools or small lots of two or three machines has been coming to machine-tool manufacturers the past week or 10 days as the result of the effort by metal-working shops to gradually stretch their capacities to cover at least part of the demands being made upon them by Government contracts. No large lists have appeared, but the aggregate of small orders is such as to again advance delivery dates to some extent.

The labor situation, so far as it relates to strikes, has been satisfactory up to this time, but increased activity is noted in organization work among machinists by union delegates. It is not believed, however, that serious difficulties

will be encountered, but the exact purpose of the new activity among union machinists has not come to light.

The Wisconsin Shipbuilding & Navigation Corporation of Milwaukee has been incorporated under the laws of Delaware, with an authorized capital stock of \$5,000,000, by Milwaukee interests to establish a shipbuilding plant and engage in the construction of steel ships at Milwaukee for ocean service. The yards will probably be established on a 20-acre site on the Kinnickinnic River, near Greenfield Avenue, which recently was offered without charge for the duration of the war by its owners, Louis J. Petit and Fred Vogel, Jr., presidents of the two largest National banks in Milwaukee. The incorporators of the new company include Paul E. Thomas, president and general manager Kempsmith Mfg. Co.; Carl C. Joys, of Vance & Joys, vessel agents; Alvin P. Kletzsch, Philip Schwab, Paul E. Kremer, Dr. A. J. Puls and George A. Schroeder, Milwaukee, and Frank W. McNeal, naval architect and engineer, New York. Others interested are: Theodore Viliter, president Viliter Mfg. Co.; Charles W. Allis, William W. Allis, Albert O. Trostel, Albert F. Vogel, George T. Johnson, A. Bloedel, Louis W. Bunde, William H. Upmeyer, and members of the Gerlinger Steel Casting Co., Milwaukee; John F. Knight, Cleveland; H. J. Bawden, New York, engineer Terminal Panama Steamship Co. The capital stock is divided into equal amounts of preferred and common shares. The company has opened offices at 831 Merchants & Manufacturers Bank Building, Milwaukee. It has offered to the Government its co-operation with the Emergency Fleet program and will be prepared to construct steel ships according to Government standards within 60 or 90 days. Facilities will be provided for building two boats at one time, and the services of fabricating and erecting shops in Milwaukee and vicinity, will be employed. The ships will be of Welland Canal size, so that they may be transferred from the Great Lakes to the Atlantic seaboard with cargoes. Frank W. McNeal, chief engineer of the new interest, has been associated with William T. Donnelly, naval architect and constructor, New York.

The Universal Machinery Co., 784 Thirtieth Street, Milwaukee, maker of lathes and other machine-tools, has engaged Frank E. Gray, architect, 86 Michigan Street, to prepare plans for its proposed new foundry and machine-shop group, to be established at the foot of Sixty-fourth Avenue, at an estimated cost of \$250,000. The foundry equipment will include one 10-ton crane and numerous smaller cranes and hoists. E. C. Devlin is president and Jay E. Purdy, secretary.

The United States Switch Co., Eau Claire, Wis., which began operations Oct. 15, 1917, will erect additions to double the capacity of its foundry. Contracts will be awarded shortly for the erection of a warehouse and stock room to relieve pressure upon the machine-shop. The space thus released will be equipped for machine work for which the company is buying milling machines, turret lathes, bolt cutter, forging equipment, and several engine lathes. It was announced at the first annual meeting last week that as soon as practicable a 1-ton electric steel furnace will be installed to accommodate its needs for manganese steel castings. A complete drop forge unit also will be added. James W. Hubbard is president and general manager.

The DePere Mfg. Co., DePere, Wis., affiliated with the Joliet Bridge & Iron Co., Joliet, Ill., has plans for a 60-ft. addition to the main shop, and an extension to the blacksmith shop, 25 x 50 ft. A second story will be added to the office building. The company is working on a contract for 55 200-hp. marine boilers for the Government, and upon its completion will start work on a repeat order for 22 similar units. Ward Clark is manager.

The Wisconsin Gun Co., Milwaukee, is now engaged in the regular production of 3-in. field pieces of the U. S. Model 1916, at the rate of three daily. The first delivery was made to the Government the past week and regular shipments will be made from now on. The field piece is manufactured complete ready for mounting on carriages at Government arsenals. The working force is being increased from 200 to 360 men and practically no difficulty is being experienced in procuring highly skilled labor. Henry J. Wiegand is general works manager.

The Curtis Tool Co., Fond du Lac, Wis., manufacturer of tools, dies, fixtures and other machine-shop devices, has moved its plant from 116 South Main Street to the Haas Building, Macy and West Second streets, where an increase of 50 to 75 per cent in output is made possible. The company was organized a year ago by W. G. Curtis, for six years superintendent of the toolroom of the Rex Typewriter Co., Fond du Lac. Several new machines will be installed at once and the force increased.

The Magnetic Mfg. Co., 601 Enterprise Building, Milwaukee, has increased its capital stock from \$15,000 to \$25,000 to accommodate its increasing business.

The Allen-Bradley Co., 495 Clinton Street, Milwaukee,

manufacturing rheostats and other electric controlling devices, has plans for a two-story brick shop addition, 50 x 100 ft. The architect is A. C. Eschweiler, Goldsmith Building.

The Rib Lake Lumber Co., Rib Lake, Wis., has awarded the general contract to Ernest Prue, Tomah, Wis., for the erection of a new machine and repair shop to cost about \$15,000.

The E. & W. Mfg. Co., 319-325 Oregon Street, Milwaukee, manufacturer of commercial car attachments for Ford and other automobiles chassis, is increasing its output to 25 units daily by enlarging its floor space and adding some new equipment. George H. Williams, secretary and treasurer of the company, has retired from other interests to take charge of the management of the business.

The J. E. F. Spark Plug Co., Milwaukee, has been organized as a limited partnership for 10 years to manufacture spark plugs and other automobile accessories and supplies. The capital stock is \$6,500. F. Remstack and Harry Herz will direct the business.

The Racine Auto Top Co., Racine, Wis., has awarded contracts for the erection of a one and two-story brick and mill factory addition, 62 x 188 ft., designed by Chandler & Park, architects, Racine, and estimated to cost \$15,000.

The American Spark Plug Co., Milwaukee, has been incorporated with a capital stock of \$20,000 by Hugo Horn, Henry Wollert and Frank Robinson to manufacture spark plugs and other automobile supplies.

The Crescent Brass Foundry Co., Superior, Wis., has been organized by A. A. Williams, formerly of the Duluth Gas Engine Works, and Gustav B. Erickson, until recently associated with the Duluth Brass Works, and has established a brass foundry at 1116 North Third Street, Superior. The new company will specialize in brass and bronze castings for the shipbuilding trade, and has contracts for practically the entire requirements of the Superior Shipbuilding Co. and the McDougal-Duluth Shipbuilding Co. It also will furnish castings to the Globe Shipbuilding Co. and Whitney Brothers, Superior. Heretofore Superior shipyards have been dependent upon Duluth and other outside foundries for such castings and supplies.

Chicago

CHICAGO, May 13.

The Chicago, Burlington & Quincy Railroad is actively placing orders against the large list it issued some weeks ago and is expected to expend between \$350,000 and \$400,000. Large wheel lathes will not be bought at this time, not because of delivery, but on account of the abnormally high price of such machines, it being estimated that three would cost in the neighborhood of \$100,000.

The International Harvester Co., through its Chicago office, is getting prices on equipment, the value of which will approach \$1,500,000, to be used in its tractor plant.

The American Tractor Co., Peoria, Ill., a newly organized company, has been looking into the machine-tool market, and probably will be a buyer in the near future.

The Holt Mfg. Co., Peoria, which has enormous Government orders for caterpillar tractors and which is finishing a new building, is laying out plans for another structure.

The Benjamin Electric Co., Chicago, has purchased tools in the past week.

Miscellaneous inquiry from local shops and those in neighboring cities has been exceptionally good the past week. Deliveries are getting no worse, and in some directions show an improvement. There are some types of small or medium machines on which the production exceeds the demand, and with such tools, of course, no priority requirements are involved.

April building in Chicago continued inactive, the month being far behind that of any in ten years. Building permits showed a falling off of 70.94 per cent as compared with April last year.

Contracts have been let for a two-story factory, 48 x 104 ft., at 2533 Homer Street, Chicago, for the Invincible Blow-Pipe Co., 2531 Homer Street, to cost \$15,000.

The general contract for a one-story extension, 130 x 300 ft., to the foundry of the Electric Steel Co., Wood and Thirty-first streets, Chicago, has been awarded to the E. W. Sproul Co., 1120 West Thirty-first Street. It will be of brick, steel and concrete with composition roof and cost \$75,000.

Clarence E. Frazier, architect, 30 North Dearborn Street, Chicago, will take bids by invitation for a one-story factory, 75 x 125 ft., to be constructed for Charles A. Brown at Shields Avenue, near West Thirty-fifth Street, at a cost of \$12,000. It will be occupied by a company making bodies for Ford motor trucks.

Contracts have been placed by the J. P. Cowing Engineering Co., Chicago, for construction work on remodeling a four-story mill construction tannery at 1210 to 1220 Elston Avenue, for the Lovejoy Estate, Chicago, to cost \$60,000.

Application has been made for the incorporation of the Universal Piston Ring Co., Rockford, Ill., a new organization with a capital stock of \$40,000, which will manufacture piston rings and automobile accessories. The incorporators are W. P. Burdick, William Stenland and Frank Carney, of Rockford. The company will take over the John E. Redin Machine Co. shop in Rockford.

Franz K. Krag, manufacturer of stampings, dies, etc., 564 West Randolph Street, Chicago, has removed to a larger plant at 2219 South Halsted Street. H. E. Walker is supervising mechanical engineer.

The Riverside Iron Works, Buffalo Avenue, Chicago, has filed plans for the construction of a one-story foundry, 60 x 75 ft., to cost \$20,000.

The addition to be constructed by the Lyon Metallic Mfg. Co., South Michigan Avenue, Chicago, at its works at Aurora, Ill., is estimated to cost about \$50,000. The structure will be one-story, 100 x 140 ft.

Detroit

DETROIT, May 13.

Indications from Washington that future large war orders be placed in the middle western states to alleviate the congestion on the seaboard has caused machine-tool dealers to predict that within a short time the market will be extremely brisk.

Small orders for machine tools from munition makers suffice to keep the market above normal. No large orders have been placed, but demand is constant for standard machines of the better class for the manufacture of war material. The production of automobiles is steadily being curtailed, due to lack of raw material, especially steel. Automobile makers indicate that they do not think the Government will arbitrarily cut the output, but market conditions will force them to turn more extensively to the manufacturer of munitions. It is estimated that at the present time, more than half the output of all Detroit automobile factories is in some form of munitions. The labor shortage continues to increase, and indications are that factories will begin to employ women on a scale hitherto unapproached. Building improved during the month of April but is still far from normal, being less than one-fourth of the total of the same month a year ago.

The Chief Motor Co., formerly of Canada, has located in Port Huron, Mich., and will manufacture motors for farm tractors, employing between 250 and 300 men. The company is incorporated for \$1,000,000, and operates a plant at Toronto. It has purchased the property of the Port Huron Construction Co., later the Monroe Motors Co., and has taken possession. It was organized by J. G. Erd and son, H. S. Erd, organizers and former heads of the Erd Motor Co., Saginaw, in which they are still financially interested. J. G. Erd, an officer of the new corporation, states that he expects to start with a manufacturing capacity of between 20 and 25 motors daily.

The organization of the Peninsular Shipbuilding Corporation, Muskegon, Mich., has been completed, a site has been secured, and work on construction will be in progress immediately. Present plans call for approximately 500 workmen, and when in full operation 1000 to 1500 men will be employed. It has a capital stock of \$500,000 with a bond issue of \$500,000 bearing six per cent interest. It is intended to have the plant completed in less than four months.

The Traction Motor Corporation, Kalamazoo, Mich., has been organized by George L. Erwin, Edmund Mans, and William Munroe, for the manufacture of tractors. Of the capital stock of \$200,000 a total of \$150,000 has been subscribed, of which \$22,500 was paid in cash.

The Aluminum Castings Co., Detroit, has let contracts for a one-story brick and fireproof acetylene gas plant, to be erected on their factory site located at Dunn Road and Jos. Campau Avenue.

The Buhl Malleable Co., Wight Street, Detroit, Mich., is making improvements and extensions in its two-story foundry to cost about \$35,000. A. W. Kuteche, Ford Building, is the contractor.

The Flower Stephens Mfg. Co., Parkinson Avenue, Detroit, Mich., will build a new one-story addition to its foundry, about 35 x 150 ft., to cost \$18,000.



Costumes Worn by Women Workers in Automatic Screw Machine Department of Packard Motor Car Co., Detroit

Cleveland

CLEVELAND, May 13.

The demand for single machines and small lots of machine tools from munition manufacturers, shipyards and makers of motor parts continues active. The Standard Parts Co. and the Standard Equipment Co., Cleveland, have bought some additional screw machine equipment, and an order from the Lima Locomotive Works is for two 6-ft. radial drills. Boring mills and planers are in heavy demand, with deliveries very slow. Deliveries on small milling machines have eased up somewhat. A good volume of inquiry for screw machines is coming from Buffalo and other districts from companies expecting Government contracts. Some machine tool builders are receiving inquiries from foundries as to the use to which their castings are put, evidently in anticipation of the canvass to be made which may lead to the shutting off of the supply of pig iron for making castings for any purpose except for war essentials. As about all the machine tools now being made, however, are for use for war work directly or indirectly, it is not believed that curtailment in the use of pig iron will affect machine tool builders.

The scarcity of skilled labor in local plants is increasing, and many could use additional workmen if they were available. Plans are being worked out by some Cleveland manufacturers to employ Canadian soldiers who have been crippled to such an extent that they cannot return to military service.

The Van Dorn Iron Works Co., Cleveland, has commenced building 750 fighting tanks for the Government, and another order for 600 tanks is pending. The motors for the tanks are being made by the Maxwell Motor Car Co.

The Cleveland Milling Machine Co., Cleveland, has filed plans for an addition, 31 x 300 ft., three stories and basement. The contract has been awarded to the Burchard-Roberts-Wales Co., Cleveland.

The William McClellan Co., Cleveland, proprietor Cleveland File Works, will at once begin the erection of a new forge shop 50 x 175 ft., and an annealing room 45 x 150 ft., of brick and steel construction.

The Bunting Brass & Bronze Co., Toledo, Ohio, will erect a two-story brick and steel brass foundry, 120 x 175 ft., which it expects to have completed in about 60 days. The company has received large Government orders for bearings and for bronze and brass machinery parts. The new plant will have a capacity of 40,000 to 50,000 lb. of brass castings per day.

The Toledo Tap & Die Co., Toledo, recently organized by Robert E. Ellery to manufacture taps and dies, has under erection a new plant, 50 x 200 ft., which will be placed in operation about July 1.

The Kelley-Cohen Foundry Co., Canton, has just completed an addition to its foundry, and will erect another building for a shipping department and offices.

The Timken-Roller Bearing Co., Canton, has placed a contract with the Fuller Construction Co., Cleveland, for an addition, 200 x 300 ft., one and two stories, to be occupied by shipping, assembling and other departments.

The Union Metal Mfg. Co., Canton, Ohio, is planning the erection of an addition.

The American Clay Machinery Co., Bucyrus, Ohio, will enlarge its plant by an extension approximately 130 x 242 ft., to a new building recently erected. With its completion the building will have a floor space of about 100,000 sq. ft.

The Farrell-Cheek Foundry Co., Sandusky, will build an addition to its plant, increasing its capacity about 25 per cent.

Indianapolis

INDIANAPOLIS, MAY 13.

Government contracts recently with manufacturers in the Calumet region, northern Indiana, including the adjacent cities of Gary, Indiana Harbor and Hammond, amount to \$200,000,000 mainly for artillery and freight cars. Among the beneficiaries are the Haskell & Barker Co., Michigan City, Pullman Co., Standard Steel Car Works, the Standard Steel Forgings Co. and the Gary Ordnance Co., subsidiary of the United States Steel Corporation.

The Stava Brothers Mfg. Co., Indianapolis, has been incorporated with \$20,000 capital stock, by Fred R. Stava, Luther A. Stava and J. H. Snow, to manufacture machinery.

The Automatic Safety Device Corporation, Hammond, Ind., has been incorporated with \$300,000 capital stock by Frank Eshom, Robert H. Izor, Herbert Lane, George E. Orr and R. W. Dunn to manufacture articles of wood, iron and steel.

The Inland Steel Castings Co., Terre Haute, Ind., has changed its name to Inland Malleable Iron & Steel Co.

The new addition to be erected at the aircraft works of the Nordyke & Marmon Co., Indianapolis, Ind., manufacturer of automobiles, will be one-story, 120 x 176 ft., and will cost \$42,000. The Austin Co., Cleveland, O., is the contractor.

St. Louis

ST. LOUIS, May 13.

Matthews & Co., Poplar Bluff, Mo., will re-equip their cotton gin, requiring about \$3500 worth of machinery to replace that destroyed.

Gueydan, La., will expend \$15,000 on electric light plant equipment, including crude oil engines, etc., also an ice plant with a daily capacity of 10 tons.

The Union Fertilizer & Reduction Co., Little Rock, Ark., Joseph Berger, Sr., G. B. Rose and others interested, is in the market for about \$10,000 worth of equipment.

The Mutual Motors Co., Little Rock, Ark., will install machine shop equipment and is in the market for lathes, back-gearied drill presses, air compressors, portable crane, and other machinery.

The Tulsa Iron Works Co., Tulsa, Okla., M. J. Flanagan and others interested, is in the market for about \$15,000 worth of equipment.

The Nimrod Oil & Refining Co., Ardmore, Okla., capital \$500,000, incorporated by P. C. Linge, D. C. Fitzgerald and others, will equip a refinery.

The Columbian Oil & Refining Co., Oklahoma City, Okla., capital \$400,000, incorporated by J. B. McNew, Oklahoma City, L. E. Lyon and J. H. Fugate, Binger, Okla., and others, will install equipment for a refinery.

The Blue Ribbon Oil & Refining Co., Oil Exchange Building, Walters, Okla., has organized with John Aldridge, Oklahoma City, president and general manager, J. W. Bratton, D. B. Malarnee and A. R. Patterson of Walters and is in the market for equipment for a 10,000-bbl. pumping station and a refinery with a daily capacity of 5000 bbls.

The A. M. Richardson Lumber Co., Helena, Ark., has been incorporated with a capital stock of \$100,000 by A. M. Richardson and others and is receiving bids for power plant and mill equipment.

The Bear Creek Lumber Co., Leaksville, Miss., will rebuild its plant recently burned with a loss of \$100,000.

The Arkansas Battery Co., Little Rock, Ark., W. P. Galway president, will equip a plant and will buy about \$10,000 worth of machinery.

The Creekmore Motor Co., Fort Smith, Ark., has added \$40,000 to its capital to install a machine shop and repair plant.

H. J. Burkhart, Pine Bluff, Ark., will equip a woodworking plant to cost about \$250,000.

The Hominy Cotton, Oil & Ice Co., Hominy, Okla., is in the market for boilers and other power plant equipment.

Fire, May 3, destroyed the plant of the Henry Wrape Co., Paragould, Ark., manufacturer of staves, etc., including machinery, boilers, engines and other equipment, with loss estimated at \$75,000.

Texas

AUSTIN, May 11.

The Mercedes Water, Light & Power Co., Mercedes, will install a new engine of 100 hp. capacity and a new generator. When the new equipment is in operation an all-day electric power and light service will be given.

The Southern Mfg. & Plating Co., Fort Worth, has increased its capital stock from \$5,000 to \$25,000 and will install a department for retinning cans.

The Alliance Milling Co., Denton, will install new equipment in its flour mill at a cost of about \$50,000.

The Lufkin Cotton Compress Co., Lufkin, has been incorporated with a capital stock of \$30,000 and will build a plant. W. M. Glenn is a stockholder.

The Alamo Gin Co. will build a cotton gin at San Antonio at a cost of about \$5000.

The cotton gin owned by Martin & Davis, Bangs, which was recently destroyed by fire, will be rebuilt at a cost of about \$200,000.

The Emergency Fleet Corporation, Washington, is planning for the construction of shipbuilding works at Beaumont, to cost about \$500,000. The proposed plant will be used primarily for assembling, with initial operations on vessels of about 2500-ton type.

California

LOS ANGELES, May 7.

The American Can Co., Vernon, has awarded a contract to Leonhardt & Peck, Los Angeles, for the construction of two additions to its plant, each two-story, 43 x 110 ft. One will be used as a machine shop and the other for general manufacturing.

The Washington Iron Works, 1924 Sacramento Street, Los Angeles, manufacturer of porcelain enameled specialties, etc., has had plans prepared for the erection of two one-story additions, 30 x 75 ft. and smaller.

The Yankee Motors Corporation, Los Angeles, has been incorporated with a capital of \$21,000 to manufacture motors, etc. R. A. and Garfield Johnson, Howard M. Hunter, 157 North Toluca Street; and F. K. Sparks, 703 Manhattan Place, are the incorporators.

Kaufman & Sons, Santa Ana, Cal., manufacturer of spot lamps, have filed plans for the erection of a new one-story factory at 1625 East First Street.

The Craig-Wilde Shipbuilding Co., Los Angeles, organized by George L. Craig and Louis J. Wilde, has acquired a lease on 30 acres in the Wilmington section for the construction of a steel shipbuilding plant. It is estimated to cost about \$300,000.

The Stetson Machine Co., Los Angeles, has been organized to operate works at 324 San Fernando Boulevard. F. F. Stetson, 359 San Fernando Boulevard, heads the company.

The Bannister Hydroelectric Co., Los Angeles, has been incorporated with a capital of \$200,000 to construct a hydroelectric power plant. Robert and G. R. Bannister, and P. H. Brown, Los Angeles, are the incorporators.

The Western Gas Engine Co., North Main Street, Los Angeles, manufacturer of distillate and oil field engines, mining hoists, etc., will build a one-story addition to its foundry, 25 x 60 ft.

The Kern County Cotton Gin Co., Bakersfield, Cal., recently incorporated with a capital of \$75,000, is planning for the erection of a plant. W. W. Kelly and George McCutchen head the company.

W. E. Babb, 359 East Main Street, Long Beach, is planning for the erection of a one-story addition, 50 x 50 ft., to his metal-working plant on Locust Avenue.

The Kay Bee Mfg. Co., Los Angeles, has been incorporated with a capital of \$25,000 to manufacture lighting fixtures, etc. Kirk White, B. A. Weyl, and Charles E. Fleming are the incorporators.

The Twelfth Naval District, San Diego, is taking bids for the construction of a one-story assembling shop, 150 x 150 ft., at the Rockwell Field naval aviation school. Leonard Cox, civil engineer, United States Navy, is in charge.

The Advance Machine Co., Compton Avenue, Los Angeles, has taken out permits for the erection of extensions to its foundry and pattern shop.

The Diamond Gas Heater Co., 2622 South Main Street, Los Angeles, has been organized to manufacture gas heaters. W. T. Hays, 435 South Alexandria Avenue, and Edwin F. French, 526 South St. Louis Street, head the company.

The Craig Shipbuilding Co., Long Beach, Cal., is planning for the erection of additions to its machine shop, foundry and forge shop. It is said that the present output will

be doubled. The company recently received a Government contract for the construction of eight steel freighters at a cost of approximately \$13,000,000 and plans for the early erection of a new 450-ft. berth. The present berths will also be extended.

The board of education, Los Angeles, has received bids for the construction of a one-story, brick machine shop at the San Pedro high school to cost about \$13,000.

The Floatless Carburetor Co., Los Angeles, has been incorporated with a capital of \$100,000 by it. Herbert V. Leahy, E. M. Hitchcock and C. F. Holland.

The Peerless Coin-Controlled Lock Co., Los Angeles, has been incorporated with a capital of \$10,000 to manufacture special locks. Fred C. Bentel and Edwin E. Dougherty, Los Angeles, are the incorporators.

The California Aviation Co., Los Angeles, manufacturer of metal parts for aircraft, has secured additional quarters adjoining its present works on Fifth Street for the enlargement of its plant. The entire plant will extend from Seaton to Colyton streets. Earle Remington is general manager.

The French-American Shipbuilding Co., San Francisco and Los Angeles, is being organized with a capital of \$2,000,000 to construct a ship plant at Newport Beach, near Los Angeles. It will be equipped for the construction of oil tankers and other vessels. William E. Russell, Haas Building, Los Angeles, George M. Chartier and C. E. Edwards are interested in the company.

A new forge shop, engine plant and compressor works will be erected by the Washoe Copper Co., Copperfield, Nev., at its new plant near the Nixon-Nevada property.

The Pacific Northwest

SEATTLE, May 7.

Announcement of expansion of the wooden shipbuilding program is looked upon as an important move and it is understood that contracts will be let on the basis of existing ways. A number of ways in local plans will be cleared within the next 60 days, and new contracts will be for larger ships than have heretofore been constructed. The marine engine situation in the Portland district is growing more serious every week, as the fleet of hulls increases without the arrival of necessary machinery.

The car shortage which has hampered the lumber industry for months has almost disappeared and if present conditions continue it is expected that the congestion at the mills will shortly be overcome.

Shipyards, particularly in the Oregon district, are very short of labor. The demand seems to have veered from skilled workmen to common labor. The shortage is also felt in almost every branch of work, and especially in the farming districts.

Duthie & Co., shipbuilders, Seattle, will at once begin the construction of a machine and joiner shop, 80 x 288 ft.

The Gulowsen-Grei Engine Co., Seattle, will call for bids within the next 30 days for the construction of a plant 174 x 300 ft. on Salmon Bay to cost \$400,000. Plans are being prepared by S. E. Sonnichsen, Downs Block, Seattle.

The Bay City Shipyards Co., Bay City, Ore., has been formed with capital stock of \$150,000 by H. E. Hartline, John Nelson, W. B. Hollingsworth and W. W. Innis, all of Portland. It will build a four-way shipyard in Bay City.

The plant of the Washington Ornamental Iron Works, Spokane, Wash., has been leased by A. Treppe and Arthur Busch, who will operate it under the name of the Washington Architectural Iron & Wire Works. The new firm will manufacture elevator enclosures, elevator cars, iron stairs and railings, wire and iron window guards, etc. The foundry department has been taken over by Graham Boyd, who will operate it under the name of the National Iron Works.

The Pacific Marine Iron Works, Portland, has applied for a permit to erect docks, buildings and slips as part of its proposed plant for the installation of machinery in Government steamers.

O. E. Northquist, one of the owners of the West Side Boat & Engine Works, Seattle, has purchased the interest of his partner, and is now the sole owner of the plant. The company builds life boats and small crafts.

The King Beach Co., Mission, B. C., contemplates extensions to its plant, including additional boiler equipment.

The Todd Dry Dock & Construction Co., Tacoma, Wash., contemplates adding five more ways, besides the two now under construction, to its steel shipbuilding plant. This will give the yards a total of 11 ways. Other improvements include an addition to the steel plate buildings and new shops for work on the new ways. A. J. Eves is assistant manager.

The Hewitt Dry Dock & Shipbuilding Co., Tacoma, recently incorporated for \$500,000, contemplates the construction of a plant with 16 ways for wooden ships and four for concrete ships.

The Foundation Co., Tacoma, Wash., is preparing plans for a new unit to the local shipyards and increasing the number of employees more than 50 per cent.

J. Helser, 493 North Twenty-second Street, Portland, plans to erect a one-story machine shop, for general machine and repair business.

The Northwestern Steel Co., Portland, will erect a one-story rivet shop to cost \$10,000.

The Vincent Sawmill, Anacortes, Wash., was recently destroyed by fire, with a loss of \$40,000. It is reported the plant will be rebuilt.

The Hammond Lumber Co., Astoria, Ore., plans the installation of additional electric power equipment, including turbine, and generator of 2000-hp. capacity and four 600-hp. water tube boilers.

The Norway Pacific Dry Dock & Construction Co., Everett, Wash., has begun work on its plant, which will be rushed to completion.

It is stated that plans are complete for the establishing of a concrete shipyard at Tacoma, near the mouth of Chambers Creek. The plans cover an aerial tramway from the hills to elevators, which will distribute the material by gravity. There will be two sets of launching ways and a complete vessel turned out in 90 days. Henry Hewitt of Tacoma is at the head of the enterprise.

The Sawyer-Reid Co., Everett, Wash., has been incorporated with a capital stock of \$40,000 by C. and R. H. Parker, to build steel and wooden ships.

The Northwest Trading Co., Seattle, is in the market for the following electric power and lighting equipment for Hongkong, China: A plant of about 3000 kw. capacity, turbine set preferred, otherwise a plant of suitable generators direct-connected to reciprocating engines, or an offer for any plant from 1500 up to 3000 kw. The electrical end of the plant must be three-phase, 6600 volts, 50 cycles. Auxiliary apparatus including suitable boilers for coal fuel and surface type condensing apparatus with cooling water figured at 75 deg. Fahr. is desired.

Canada

TORONTO, May 13.

The Canadian Forging & Socket Co., Ltd., Tilbury, Ont., has been incorporated with a capital stock of \$250,000 by Edmund G. Odette and James Foster, both of Tilbury; William Horne and others of Windsor, to manufacture steel forgings, bow sockets, etc.

The International Business Machines Co., Ltd., has been granted license to do business in Ontario, with a capital stock of \$400,000, to manufacture machinery, tools, etc. Frank E. Mutton, 158 Madison Avenue, Toronto, Ont., is the representative.

Grace Motors, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Richard T. Heneker, Henry N. Chauvin, Hugh Wylie and others to manufacture motors, engines, machinery, tools, automobiles, etc.

Rhodes, Curry & Co., Wentworth Street, Sydney, N. S., will spend about \$3000 on electric motors.

H. W. Stickle, Water Street, Thorold, Ont., is in the market for a 6 or 7-hp., 60-cycle electric motor.

The Timberland Lumber Co., New Westminster, B. C., is building a sawmill on the Fraser River, which will cost approximately \$100,000. It is expected to be ready for operation by next December.

Good progress is being made on the plant for the Dominion Shipbuilding Co. at the foot of Bathurst Street, Toronto, the main building of which will be 485 x 220 ft. Foundations are being laid for the machine shop, blacksmith shops, pipe and electric shops. The company has contracts on hand for the construction of 12 steel ships.

The British Forgings, Ltd., Toronto, Ont., will build an addition to its saw shop on Commissioner Street to cost \$7000.

The Galt Brass Co., Galt, Ont., will build an addition to its plant, 114 x 164 ft., at a cost of about \$40,000.

The R. McDougall Co., Galt, manufacturer of machine tools and pumps, will build a three-story addition to its plant, 64 x 120 ft., to cost \$60,000.

Longs & Roddis, Rosedale, Hope, B. C., are having plans prepared for the erection of a sawmill to cost \$60,000.

Regina, Sask., will spend from \$175,000 to \$200,000 for a new electric unit of 5000 kw. George Beach is clerk.

The Dominion Coal Co., Sydney, N. S., is making preparations for extensive power developments, including central power station at New Watford, N. S.

Charles Morneau, St. Donat, Que., is in the market for sawmill machinery, also a turbine pump.

The Pedlar People, Ltd., Oshawa, Ont., has completed a building 80 x 125 ft. for its culvert department, thus making room in another section of the plant for the sheet metal stamping department, a new branch of its industry. The plant is equipped to handle certain lines of motor car work, as well as serving other industrial purposes, including marine equipment.

The St. Mary's Wood Specialty Co., Ltd., St. Marys, Ont., is in the market for a 5 or 7½-hp. motor, 550 volts.

It is reported that the Lyall Construction Co., Montreal, has received a large war contract from the United States Government which will run into several millions of dollars. In order to handle this and other orders the company has secured a site east of Dominion Park and will start work immediately on the erection of a new plant. While it has not yet been definitely announced, it is understood that it is the intention of the company to eventually move its entire plant to the east end. It is said that there is no opportunity for enlargement at the present works.

The plant of Munitions & Metal Products Co., Ltd., Montreal East, was damaged by fire May 4 with a loss of \$25,000. It will be rebuilt.

The plant of the Rolling Mills Co., Medicine Hat, Alta., was damaged by fire May 2 with a loss of \$45,000. Considerable machinery will have to be replaced.

Government Purchases

WASHINGTON, May 13, 1918.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, May 3, 6 and 7, for supplies for the naval service, as follows:

Schedule 3948½, Ordnance

Class 55, Washington—Four radial drills—Bid 73, \$3,735; 132, \$4,580 and \$4,462; 144, \$4,308; 151, \$5,140; 168, \$4,645; 231, \$4,785; 237, \$5,147.50; 278, \$4,648 and \$4,553.

Class 56, Washington—Two engine lathes—Bid 72, \$9,159; 73, \$8,320; 137, \$7,698 and \$6,948; 144, \$6,572; 151, \$8,486; 168, \$7,565; 231, \$7,095; 237, \$6,609.

Class 57, Washington—Six engine lathes—Bid 72, \$5,720; 137, \$4,658 and \$3,886; 144, \$4,265; 151, \$4,760; 168, \$4,045 and \$3,750; 237, \$4,691; 264, \$3,800.

Schedule 3949½, Ordnance

Class 58, Washington—Seven wire feed screw machines—Bid 24, \$1,352.05; 132, \$1,308.

Schedule 3950½, Ordnance

Class 59, Washington—Nine engine lathes—Bid 137, \$96,-426 and \$88,377; 144, \$68,100; 151, \$95,871; 168, \$86,760; 231, \$87,990; 237, \$93,570; 278, \$89,511.

Class 60, Washington—Two lathes—Bid 144, \$9,470; 168, \$15,130; 231, \$13,550; 237, \$13,688.

Schedule 4148½, Yard and Docks

Class 71, f.o.b. works—Traveling crane—Bid 17, \$3,937; 26, \$6,750; 102, \$2,285; 168, \$5,275; 246, \$6,700; 270, \$3,263.

Schedule 4023½, Ordnance

Class 72, Washington—Three engine lathes—Bid 83, \$1,236; 132, \$2,371, \$1,774; 144, \$2,264; 151, \$2,103; 168, \$2,155, \$2,345; 176, \$2,006, \$1,911; 229, \$1,942; 263, \$1,574.10; 278, \$2,403.

Class 73, Washington—Nine engine lathes—Bid 83, \$1,920; 132, \$2,371, \$1,801; 144, \$2,218; 151, \$2,172; 168, no total; 176, \$1,960, \$1,846; 229, \$1,952; 263, \$1,538.90; 278, \$2,354.

Class 74, Washington—Eight engine lathes—Bid 73, \$1,415, \$1,519; 83, \$1,806; 144, \$1,195; 151, \$1,672; 168, \$1,960, \$2,150; 229, \$1,974.

Schedule 4219½, Steam Engineering

Class 139, Brooklyn—Two precision lathes, motor spares and controller spares—Bid 184, \$2,364, part; 211, \$2,481.20.

Class 140, Brooklyn and Mare Island—Four motor-driven portable cylinder boring machines—Bid 83, no total; 151, \$3,114; 204, \$2,375.

Schedule 4263½, Steam Engineering

Class 206, Philadelphia—Four shapers and 48 shaper tools—Bid 132, \$960; 176, \$1,244.50; 237, \$1,000.

Schedule 3937½, Ordnance

Class 928, Newport—One power press—Bid 37, \$3,050.

Class 929—Newport—One automatic machine and one cutter grinder—Bid 184, \$4,330, part.

Class 930, Newport—Full automatic turret machine—Bid 60, \$6,873.25; 163, \$4,236.

Class 932, Newport—Three engine lathes—Bid 83, \$5,226; 168, \$8,150 and \$7,390.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 17, Alfred Box & Co.; 24, Brown & Sharpe Mfg. Co.; 26, Bedford Foundry & Machine Co.; 37, E. W. Bliss Co.; 60, The Cleveland Automatic Machine Co.; 72, Driggs Mfg. Co.; 73, Wm. F. Davis Machine Tool Co., Inc.; 83, The Fairbanks Co.; 102, H. D. Granger Co.; 132, Kemp Machinery Co.; 137, The Lodge & Shipley Machine Tool Co.; 144, L. R. Meisenhelter Machinery Co.; 151, Manning, Maxwell & Moore, Inc.; 163, The National Acme Co.; 168, Niles-Bement-Pond Co.; 176, D. Nast Machinery Co.; 184, Henry Prentiss & Co.; 204, E. J. Rooksby & Co.; 211, Rivett Lathe & Grinder Co.; 229, The Philip Smith Mfg. Co.; 231, Swind Machinery Co.; 237, Sherrit & Store Co.; 263, Ward & Co.; 264, Whitecomb-Blaisdell Machine Tool Co.; 270, Whiting Foundry Equipment Co.; 278, Aumen Machinery Co.

Schedule 4330½, Yards and Docks

Class 317, Pensacola—One self-propelled crane—Bid 7, \$7,147, f.o.b.; 16, \$4,550; 92, \$7,650; 112, \$7,480.

Schedule 4286½, Steam Engineering

Class 318, Norfolk—Four turret screw machines—Bid 46, \$2,492; 67, \$2,313.50; 123, \$1,445.

Class 319, Norfolk—Five turret screw machines—Bid 65, \$3,070; 67, \$2,876; 123, \$1,840.

Schedule 4064½, Steam Engineering

Class 321*, Mare Island—One engine lathe, one set tool holders and two chucks—Bid 67, \$2,028.75; 18, \$3,121; 90, \$2,419, part; 91, \$2,132; 102, \$1,929; 138, \$2,561.60.

Class 322, Mare Island—One tool post grinder—Bid 30, \$75; 39, \$50; 67, \$54 and \$80; 81, \$75; 138, \$103.

Class 323, Mare Island—One universal machine and one vise—Bid 81, \$4,019; 138, \$2,589.

Class 324, Mare Island—One sensitive drill—Bid 30, \$216.50; 31, \$360; 39, \$289; 58, \$234.50; 67, \$230.50, \$393.75 and \$261.75; 72, \$470, \$590, \$469 and \$508; 81, \$262; 138, \$318.

Class 325, Mare Island—One grinder—Bid 30, \$356; 67, \$319.50; 81, \$303; 138, \$283.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 7, F. C. Austin Co., Inc.; 16, The John F. Byers Machine Co.; 18, A. W. Burritt Co.; 30, James Clark, Jr., Electric Co.; 31, The Cincinnati Pulley Machinery Co.; 39, Wm. F. Davis Machine Tool Co.; 46, The Fairbanks Co.; 58, Hoefer Mfg. Co.; 65, Jones & Lamson Machine Co.; 67, Kemp Machinery Co.; 72, The Sipp Machine Co.; 81, Manning, Maxwell & Moore, Inc.; 90, Niles-Bement-Pond Co.; 91, The National Lathe Co.; 92, The Osgood Co.; 102, The Rath Larmon Co.; 112, The Thew Automatic Shovel Co.; 123, The Warner & Swasey Co.; 138, Sherritt & Stoer Co., Inc.

Schedule 4302½, Steam Engineering

Class 258, Philadelphia—One universal radial drill—Bid 32, \$2,914; 85, \$2,290; 106, \$3,570; 115, \$3,130.

Schedule 4358½, Steam Engineering

Class 376, Brooklyn—One engine lathe—Bid 32, \$640; 46, \$640; 68, \$806; 85, \$1,190; 95, \$955; 123, \$852; 138, \$1,255.

Class 377, Brooklyn—one plain milling machine—Bid 32, \$975; 50, \$1,167.65; 85, \$2,435; 123, \$1,915.

Class 378, Brooklyn—One horizontal boring mill—Bid 46, \$5,280.

Class 379, Brooklyn—One shaper—Bid 32, \$1,218; 46, \$1,258 and \$1,185; 68, \$850; 85, \$1,540; 95, \$1,785; 123, \$1,395; 138, \$1,005.

Class 380, Brooklyn—One shaper—Bid 32, \$839; 46, \$980 and \$945; 68, \$712; 85, \$1,005; 95, \$1,125; 123, \$1,000; 138, \$845.

Class 381, Brooklyn—Two drills—Bid 18, \$210; 32, \$352; 46, \$289; 85, \$300; 95, \$305; 123, \$1,020; 138, \$404.

Class 382, Brooklyn—One pipe-cutting and threading machine—Bid 46, \$675; 68, \$920; 69, \$1,566.80; 85, \$1,375; 138, \$460.

Schedule 4359½, Steam Engineering

Class 387, Brooklyn—One oxy-acetylene outfit—Bid 6, \$829.85; 18, \$69.60; 77, \$954.50.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 6, The Alexander Milburn Co.; 18, Buffalo Forge Co.; 32, Wm. F. Davis Machine Tool Co.; 46, The Fairbanks Co.; 50, The Garvin Machine Co.; 68, Landis Machine Co.; 77, Macleod Co.; 85, Niles-Bement-Pond Co.; 95, Henry Prentiss & Co., Inc.; 106, W. D. Shipley Machinery Co.; 115, Swind Machinery Co.; 123, Vandyck Churchill Co.; 138, Sherritt & Stoer.